

The Two-Wavelength Method of Microspectrophotometry

II. A Set of Tables to Facilitate the Calculations*†

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ABSTRACT

The calculations required for two-wavelength measurements are time consuming and laborious. In order to circumvent this limitation of the method, a set of tables which combined four operations into one has been designed and is reproduced within. The tables are based on Patau's formulae. The two transmission readings obtained according to the photometric method provide the coordinates which lead directly to a value for the relative absorbance. The product of this absorbance and the area of the photometric field gives the relative amount of chromophore in the field. The range of transmission values covered in the table corresponds to the effective range of the two-wavelength method.

In spite of the fact that Patau (1) greatly simplified the calculations for the two-wavelength method, they are still very laborious, and take at least as long as the measurements. Because the operations involved are a mixture of division, subtraction, multiplication, and reference to a table, they are not prone to further simplification. After casting about for a suitable method, it was decided to construct a set of tables which would combine as many of the operations as possible. It was realized that the tables would be cumbersome and would take considerable time to prepare; however, they have long since repaid the effort put in to them, and they can now be offered to others using the two-wavelength method.

Patau's formulation of the two-wavelength method can be stated in the following equations:

$$m_i = \frac{BL_a C}{k_a \ln 10}$$

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$$C = \frac{1}{2 - Q} \ln \frac{1}{Q - 1}$$

$$Q = \frac{L_b}{L_a} = \frac{1 - T_b}{1 - T_a}$$

B is the area of the photometric field, m_i is the total amount of chromophore, T is the transmission, and k is the absorptivity. Patau has supplied a table giving C in terms of Q . The subscripts a and b refer to two wavelengths such that $k_b = 2 k_a$.

In practice, one determines two transmission values for a field of a specified area. Each of these transmissions is subtracted from one; then the ratio Q is determined. C is obtained from Q using Patau's table, and the relative amount of chromophore is calculated from $BL_a C$. The new tables have been based on Patau's calculations and have been designed so that $L_a C$ is obtained directly from the two transmissions.

The tables were constructed by calculating the product $L_a C$ for every pair of two-digit transmissions likely to be met in practice. The intermediate values, corresponding to even-numbered three-digit transmissions, were estimated by interpolation; they are correct to within ± 0.2 per cent. The arrangement of the tables, and the intervals between the numbers are such that the additional interpolation necessary for the various combinations involving odd-numbered transmissions can

be made with ease. In Table VIII, only two, instead of four, interpolated values are given for the vertical scale.

To use the tables, first find the transmission value T_b on the vertical scale, and then the value T_a on the horizontal. The number in the body of the table corresponding to these coordinates is $L_aC \times 10^3$. Thus, $T_b = 0.752$, $T_a = 0.826$, $L_aC = 0.259$. The values for T_b cover a range from 0.320 to 0.880, and those for T_a extend from 0.480 to 0.930. Occasionally, values will be obtained which are outside the scope of the tables. This may be because of their magnitude, or because they have an unusual ratio to each other. Since the tables extend well beyond the effective range of the two-

wavelength method, such values should be considered with caution.

If it is at all possible to do a series of measurements with a constant field-size, the relative amount of chromophore can then be L_aC and no further calculations are necessary. Otherwise, L_aC must be multiplied by the area of the field used for each measurement.

SUMMARY

A set of tables is provided which greatly facilitate the calculations associated with the two-wavelength method of photometry.

BIBLIOGRAPHY

1. Patau, K., *Chromosoma*, 1952, **5**, 341.

TABLE I
 T_a

.32	882	878	864	856	848	840	831	822	814	806	798	789	781	773	765	757	750	743	736	729	722	714	706	698	690	683	676	669	662	656	650	643	637	631	625	619	612	606	600	594	588	582	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																																		
	887	883	874	866	857	849	839	830	822	814	805	796	787	779	771	763	756	748	740	733	726	718	710	702	694	686	678	670	662	655	648	642	636	629	623	616	610	604	598	592	586	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																																			
	897	888	879	871	862	854	844	834	826	818	809	800	791	782	774	766	759	751	743	736	728	720	714	707	699	693	687	680	672	665	659	652	645	638	631	625	618	612	606	600	594	588	581	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																																		
.33	902	893	884	876	867	859	849	839	830	822	813	804	795	786	777	769	761	753	746	738	730	723	717	710	702	696	690	683	675	668	662	655	648	641	634	627	620	614	608	602	596	590	583	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																																	
	913	904	895	886	877	868	858	848	839	830	821	812	803	794	784	776	768	760	752	744	736	729	723	716	709	703	695	688	681	674	667	660	653	646	639	632	625	619	613	607	601	594	587	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																																	
	918	909	900	891	882	873	863	853	843	834	825	816	807	797	788	780	771	763	755	747	739	732	726	719	712	706	699	693	686	679	672	665	658	651	644	637	631	625	619	613	607	601	594	587	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																																
	923	914	905	896	887	878	868	858	848	838	829	820	811	801	792	783	774	766	758	750	743	735	729	722	715	708	701	693	686	679	672	665	658	651	644	637	631	625	619	613	607	601	594	587	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																																
.34	928	919	910	901	892	883	873	863	853	843	833	824	815	805	796	787	778	770	762	754	746	738	732	725	718	711	703	696	689	682	675	668	660	652	645	638	631	625	619	613	607	601	594	587	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																																
	934	924	915	906	897	888	878	868	858	848	838	828	819	809	800	791	782	774	766	758	750	742	735	728	721	714	706	699	692	685	678	671	664	657	650	643	636	630	624	618	612	606	600	594	588	582	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																														
	939	929	920	911	902	893	882	872	862	852	842	832	823	813	804	795	786	778	770	762	754	746	739	732	725	717	709	702	695	688	681	673	665	658	651	644	637	631	624	618	612	606	600	594	588	582	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																														
	944	934	925	916	907	898	887	876	866	856	846	836	827	817	808	800	790	782	774	767	760	751	743	736	729	721	713	705	698	691	684	676	668	661	654	647	640	634	628	622	616	610	604	598	592	586	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																														
	949	939	930	921	912	903	892	881	870	860	850	840	831	821	812	804	795	787	779	772	765	756	747	740	733	725	717	709	701	694	687	679	672	665	658	651	643	637	630	623	616	610	604	598	592	586	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																														
.35	955	945	935	926	917	908	897	886	875	865	855	845	835	826	817	809	800	792	784	777	770	761	752	744	737	729	721	713	705	697	690	683	676	669	662	655	647	640	633	626	619	612	606	600	594	588	582	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																													
	961	951	941	931	922	913	902	891	880	870	860	850	840	831	822	813	805	797	789	782	775	766	757	749	741	733	725	717	709	701	694	687	680	673	666	659	651	643	636	629	622	615	608	602	596	590	584	578	572	566	560	554	548	542	536	530	524																																																																																																																																																																																																																																																																																													
	967	956	946	936	926	918	906	895	884	874	864	854	844	835	825	816	808	800	793	786	779	770	761	752	744	736	728	720	712	704	697	690	682	675	668	661	653	645	638	631	624	617	610	604	598	592	586	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																													
	973	962	951	941	931	923	910	899	889	879	869	858	848	839	829	819	811	804	797	790	783	774	765	756	747	740	731	723	715	707	700	693	685	678	671	664	656	648	640	633	627	619	612	606	600	594	588	582	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																												
	979	968	956	946	936	927	914	904	894	884	874	863	852	843	833	823	815	808	801	794	787	778	769	760	751	743	734	726	718	710	703	696	688	681	674	667	659	651	643	636	629	622	615	608	602	596	590	584	578	572	566	560	554	548	542	536	530	524																																																																																																																																																																																																																																																																																												
.36	986	972	962	951	941	931	919	909	899	889	879	868	857	847	837	827	819	812	805	798	791	782	773	764	755	746	738	730	722	714	707	699	691	684	677	670	662	654	646	639	632	625	618	611	604	598	592	586	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																												
	999	987	975	963	952	941	930	919	909	899	889	878	867	856	846	836	828	821	813	806	799	790	781	772	763	754	745	737	729	721	713	705	697	690	682	675	667	660	652	645	638	631	624	617	610	603	596	590	584	578	572	566	560	554	548	542	536	530	524																																																																																																																																																																																																																																																																																											
	1006	994	982	969	958	947	936	926	914	904	894	883	872	862	852	842	833	826	818	810	803	793	783	774	765	757	748	740	732	724	716	708	700	693	685	678	670	663	655	648	641	634	627	620	613	606	599	592	586	580	574	568	562	556	550	544	538	532	526																																																																																																																																																																																																																																																																																											
	1013	1001	989	976	964	953	942	932	920	910	899	889	878	868	858	848	839	831	823	814	807	797	787	778	769	760	751	743	735	727	719	711	703	696	688	681	673	666	658	651	644	637	630	623	616	609	602	595	588	582	576	570	564	558	552	546	540	534	528	522																																																																																																																																																																																																																																																																																										
	1020	1008	996	983	971	959	948	938	926	916	904	895	884	874	864	854	845	836	828	819	811	801	792	783	774	765	756	747	738	730	723	714	706	699	691	684	676	672	661	654	647	640	633	626	619	612	605	598	591	585	579	573	567	561	555	549	543	537	531	525	519	513	507	501	500	494	488	482	476	470	464	458	452	446	440	434	428	422	416	410	404	398	392	386	380	374	368	362	356	350	344	338	332	326	320	314	308	302	296	290	284	278	272	266	260	254	248	242	236	230	224	218	212	206	200	194	188	182	176	170	164	158	152	146	140	134	128	122	116	110	104	98	92	86	80	74	68	62	56	50	44	38	32	26	20	14	8	2	-4	-10	-16	-22	-28	-34	-40	-46	-52	-58	-64	-70	-76	-82	-88	-94	-100	-106	-112	-118	-124	-130	-136	-142	-148	-154	-160	-166	-172	-178	-184	-190	-196	-202	-208	-214	-220	-226	-232	-238	-244	-250	-256	-262	-268	-274	-280	-286	-292	-298	-304	-310	-316	-322	-328	-334	-340	-346	-352	-358	-364	-370	-376	-382	-388	-394	-400	-406	-412	-418	-424	-430	-436	-442	-448	-454	-460	-466	-472	-478	-484	-490	-496	-502	-508	-514	-520	-526	-532	-538	-544	-550	-556	-562	-568	-574	-580	-586	-592	-598	-604	-610	-616	-622	-628	-634	-640	-646	-652	-658	-664	-670	-676	-682	-688	-694	-700	-706	-712	-718	-724	-730	-736	-742	-748	-754	-760	-766	-772	-778	-784	-790	-796	-802	-808	-814	-820	-826	-832	-838	-844	-850	-856	-862	-868	-874	-880	-886	-892	-898	-904	-910	-916	-922	-928	-934	-940	-946	-952	-958	-964	-970	-976	-982	-988	-994	-1000	-1006	-1012	-1018	-1024	-1030	-1036	-1042	-1048	-1054	-1060	-1066	-1072	-1078	-1084	-1090	-1096	-1102	-1108	-1114	-1120	-1126	-1132	-1138	-1144	-1150	-1156	-116

TABLE III
 T_a

	.61	.62	.63	.64	.65	.66	.67	.68	.69	.70	.71																									
.44	588 581 574 567 560 553 547 541 534 527 520 513 507 501 495 489 483 477 471 465 459 453 447 441 435 430 425 414 408 402 397 392 388 383 378 373 369 364 359 354 350 346 341 336 331 326 322 317 312 308 304 300	591 584 577 570 563 555 549 543 536 529 522 516 509 503 497 491 485 479 473 467 461 455 449 443 437 431 426 421 415 409 403 398 393 388 383 378 374 370 365 360 355 351 347 342 337 332 327 323 318 313 309 305 301	594 587 580 573 566 557 551 545 538 531 524 518 511 505 499 493 487 481 475 469 463 457 451 445 439 433 427 422 416 410 405 400 395 390 385 380 376 372 366 361 356 352 348 343 338 333 328 324 319 314 310 306 302	598 590 583 576 569 560 553 547 540 534 527 520 514 507 501 495 489 483 477 471 465 459 453 447 441 435 429 423 417 412 407 402 397 392 387 382 377 373 367 362 357 353 349 344 339 334 329 325 320 315 311 307 303	602 594 586 579 571 563 555 549 542 536 530 524 517 510 503 497 491 485 479 473 467 461 455 449 443 437 431 425 419 414 409 404 399 394 389 384 379 374 369 364 359 354 350 345 340 335 330 326 321 316 312 308 304	.45	606 598 590 582 574 566 558 551 544 538 532 526 520 513 506 500 494 488 482 476 470 463 457 451 445 439 433 427 422 417 412 406 401 396 391 386 381 376 371 366 361 356 352 347 342 337 332 328 323 318 314 310 306	608 601 591 586 578 570 562 554 547 540 534 528 522 515 508 502 496 490 484 478 472 466 460 454 448 442 436 430 424 418 413 408 402 397 392 387 382 377 372 367 362 357 353 348 344 339 334 329 324 319 315 311 307	612 605 597 589 581 573 565 557 550 543 536 530 524 517 510 504 498 492 486 480 474 468 462 456 450 444 438 432 426 421 416 411 406 400 395 390 385 380 375 370 365 360 355 350 345 340 336 331 326 321 316 312 308	615 607 600 592 584 576 568 561 554 547 540 534 528 522 515 508 502 496 490 484 478 472 466 460 454 448 442 436 430 424 418 413 408 400 395 390 385 380 375 370 365 360 355 350 345 340 336 331 326 321 316 312 308	.46	620 614 606 598 590 583 576 569 561 554 547 540 534 528 522 515 508 502 496 490 484 478 472 466 460 454 448 442 436 430 424 418 413 408 402 397 392 387 382 377 372 367 362 357 352 347 342 337 332 327 322 317 313	624 616 609 602 594 587 580 572 564 557 550 542 535 528 521 514 507 501 495 489 483 477 471 464 458 452 446 440 434 428 423 418 413 408 400 395 390 385 380 375 370 365 359 355 351 346 341 336 331 326 321 317 313	628 620 612 604 596 589 582 576 567 560 552 545 538 531 524 517 510 504 498 492 486 480 474 467 460 454 448 442 436 430 425 420 414 408 402 397 392 387 382 377 372 367 361 357 352 347 342 337 332 327 322 318 314	631 623 615 607 600 592 585 578 570 562 555 548 541 534 527 520 513 507 501 494 488 482 476 469 462 456 450 444 438 432 427 422 416 410 404 398 393 388 383 378 373 368 362 358 353 348 343 338 333 328 324 319 315	634 626 618 610 603 596 588 581 573 565 558 551 544 537 530 523 516 510 503 497 490 484 478 471 464 458 452 446 440 434 429 424 418 412 406 400 395 390 385 380 375 370 365 359 355 351 346 341 336 331 326 321 317 313	.47	638 630 622 614 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383 378 372 368 363 358 353 348 343 338 333 328 323	.48	663 654 645 635 627 618 609 600 592 584 576 568 561 554 547 540 533 527 519 512 505 498 491 484 478 472 466 460 454 448 442 436 430 424 418 412 406 401 395 390 385 380 374 370 365 360 355 350 345 340 335 330 325	667 658 649 640 631 622 613 604 596 588 580 572 564 557 550 543 536 530 522 515 508 501 494 488 482 475 469 463 457 451 445 439 433 427 422 416 410 404 399 393 388 382 377 372 367 362 357 352 347 342 337 332 327 322 318 314	673 663 654 644 635 626 617 608 600 592 584 576 567 560 553 546 539 532 525 518 511 504 497 490 483 476 470 464 458 452 446 440 434 428 422 416 410 405 399 394 388 383 377 372 367 362 357 352 347 342 337 332 327	.49	686 676 667 657 648 639 630 621 612 603 594 586 578 570 563 556 549 542 536 529 521 514 507 500 493 486 479 472 466 460 454 448 442 436 430 424 418 412 407 402 396 390 384 378 373 368 364 359 354 349 344 339 334 329	691 681 672 662 652 643 634 624 615 606 598 590 581 573 565 558 551 543 535 528 521 514 507 500 493 486 479 472 466 460 454 448 442 436 430 424 418 413 408 402 396 390 384 378 373 368 362 357 352 347 342 337 332 327	695 685 676 666 656 646 637 628 619 610 601 593 585 577 568 561 554 546 538 531 524 517 510 503 496 489 483 476 469 463 456 450 444 438 432 426 420 414 410 404 398 392 386 380 375 370 364 359 354 349 343 339 335	.50	701 691 681 671 661 651 641 632 623 614 605 597 589 581 572 564 557 549 542 536 529 523 516 509 502 495 488 482 475 468 462 456 450 444 438 432 426 420 414 410 404 398 392 386 380 375 370 364 359 354 349 343 339 335	705 695 685 675 665 655 645 636 627 618 609 601 593 585 576 567 560 552 544 537 530 523 516 509 502 495 488 482 475 468 462 456 450 444 438 432 426 420 414 410 404 398 392 386 380 375 370 364 359 354 349 343 339 335	713 703 693 683 673 663 653 644 635 626 618 610 602 592 583 575 567 559 550 542 535 528 522 515 508 501 495 488 481 474 467 460 454 447 441 435 429 423 417 412 406 400 394 388 382 377 372 367 361 355 350 345 340	718 708 698 688 678 668 658 648 639 630 622 614 606 595 587 579 571 563 554 545 538 531 525 518 511 504 498 491 484 476 469 462 457 449 443 437 431 425 419 414 408 402 396 390 384 379 374 368 363 357 352 347 342 337 332	722 712 702 692 682 672 662 652 644 634 626 618 610 599 591 583 575 567 558 549 541 534 528 521 514 507 501 494 487 479 472 465 459 453 447 441 435 429 423 417 412 406 400 394 388 382 377 372 367 361 355 350 345 340 334 329 324

TABLE IV
 T_a

.50	.598	.589	.580	.571	.563	.555	.547	.539	.532	.525	.518	.511	.504	.497	.491	.485	.477	.470	.462	.456	.451	.444	.438	.432	.426	.420	.414	.408	.402	.397	.392	.386	.380	.374	.369	.364	.359	.354	.349	.344	.339	.334	.329	.325	.320	.315	.310	.305	.301	.297	.293	.289	.285																								
.51	.602	.592	.583	.575	.567	.559	.550	.542	.535	.528	.521	.514	.507	.500	.493	.488	.480	.473	.465	.460	.454	.448	.442	.436	.430	.424	.418	.412	.406	.401	.396	.390	.384	.378	.372	.367	.361	.356	.351	.346	.341	.336	.331	.326	.321	.316	.311	.306	.302	.298	.294	.290	.286																								
.52	.606	.595	.587	.579	.571	.563	.554	.545	.538	.531	.524	.517	.510	.503	.496	.491	.483	.476	.468	.462	.457	.451	.445	.439	.433	.427	.421	.415	.409	.403	.398	.392	.386	.380	.374	.369	.363	.358	.353	.348	.343	.338	.333	.328	.323	.318	.313	.308	.304	.300	.296	.292	.288																								
.53	.610	.599	.591	.583	.575	.567	.558	.549	.541	.534	.527	.520	.513	.506	.499	.494	.487	.480	.473	.465	.459	.454	.448	.442	.436	.430	.424	.418	.412	.406	.400	.394	.388	.382	.376	.371	.365	.360	.355	.350	.345	.340	.335	.330	.325	.320	.315	.310	.305	.301	.297	.293	.289																								
.54	.616	.607	.599	.591	.583	.575	.566	.557	.549	.541	.533	.526	.519	.512	.505	.499	.492	.485	.477	.470	.463	.456	.449	.443	.437	.431	.425	.419	.413	.407	.401	.395	.389	.383	.377	.371	.365	.360	.355	.350	.345	.340	.335	.330	.325	.320	.315	.310	.305	.301	.297	.293	.289																								
.55	.620	.611	.603	.595	.587	.579	.570	.561	.552	.544	.536	.529	.522	.515	.508	.501	.494	.487	.479	.472	.465	.458	.451	.444	.438	.432	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.349	.344	.339	.334	.329	.324	.319	.314	.309	.304	.299	.294																										
.56	.624	.615	.607	.599	.591	.583	.574	.565	.556	.547	.539	.532	.525	.517	.510	.504	.497	.490	.482	.475	.468	.461	.454	.447	.441	.435	.429	.423	.417	.411	.405	.399	.393	.387	.381	.375	.369	.363	.357	.351	.345	.340	.335	.330	.325	.320	.315	.310	.305	.300	.295																										
.57	.628	.619	.611	.603	.595	.587	.578	.569	.560	.551	.542	.533	.524	.515	.506	.499	.492	.484	.477	.470	.463	.456	.449	.443	.437	.431	.425	.419	.413	.407	.401	.395	.389	.383	.377	.371	.365	.359	.353	.347	.341	.335	.330	.325	.320	.315	.310	.305	.300	.295																											
.58	.632	.623	.615	.607	.599	.591	.582	.573	.564	.555	.546	.537	.528	.519	.510	.503	.496	.488	.481	.474	.467	.460	.453	.446	.440	.434	.428	.422	.416	.410	.404	.398	.392	.386	.380	.374	.368	.362	.356	.350	.344	.338	.332	.326	.320	.314	.308	.302	.296																												
.59	.636	.627	.619	.611	.603	.595	.586	.577	.568	.559	.550	.541	.532	.523	.514	.507	.500	.493	.485	.478	.471	.464	.457	.450	.443	.436	.430	.424	.418	.412	.406	.400	.394	.388	.382	.376	.370	.364	.358	.352	.346	.340	.334	.328	.322	.316	.310	.304	.298	.292																											
.60	.640	.631	.623	.615	.607	.599	.590	.581	.572	.563	.554	.545	.536	.527	.518	.510	.503	.495	.487	.480	.473	.466	.459	.452	.445	.438	.432	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.348	.342	.336	.330	.324	.318	.312	.306	.300	.294																											
.61	.644	.635	.627	.619	.611	.603	.594	.585	.576	.567	.558	.549	.540	.531	.522	.513	.506	.498	.491	.484	.477	.470	.463	.456	.449	.442	.435	.428	.422	.416	.410	.404	.398	.392	.386	.380	.374	.368	.362	.356	.350	.344	.338	.332	.326	.320	.314	.308	.302	.296																											
.62	.648	.639	.631	.623	.615	.607	.598	.589	.580	.571	.562	.553	.544	.535	.526	.517	.510	.502	.495	.488	.481	.474	.467	.460	.453	.446	.439	.432	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.348	.342	.336	.330	.324	.318	.312	.306	.300																											
.63	.652	.643	.635	.627	.619	.611	.602	.593	.584	.575	.566	.557	.548	.539	.530	.521	.512	.504	.497	.490	.483	.476	.469	.462	.455	.448	.441	.434	.427	.421	.415	.409	.403	.397	.391	.385	.379	.373	.367	.361	.355	.349	.343	.337	.331	.325	.319	.313	.307	.301	.295																										
.64	.656	.647	.639	.631	.623	.615	.606	.597	.588	.579	.570	.561	.552	.543	.534	.525	.516	.508	.501	.494	.487	.480	.473	.466	.459	.452	.445	.438	.431	.424	.417	.411	.405	.399	.393	.387	.381	.375	.369	.363	.357	.351	.345	.339	.333	.327	.321	.315	.309	.303	.297																										
.65	.660	.651	.643	.635	.627	.619	.610	.601	.592	.583	.574	.565	.556	.547	.538	.529	.520	.511	.504	.496	.489	.482	.475	.468	.461	.454	.447	.440	.433	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.348	.342	.336	.330	.324	.318	.312	.306	.300																										
.66	.664	.655	.647	.639	.631	.623	.614	.605	.596	.587	.578	.569	.560	.551	.542	.533	.524	.515	.508	.499	.492	.485	.478	.471	.464	.457	.450	.443	.436	.430	.424	.418	.412	.406	.400	.394	.388	.382	.376	.370	.364	.358	.352	.346	.340	.334	.328	.322	.316	.310	.304	.298																									
.67	.668	.659	.651	.643	.635	.627	.618	.609	.600	.591	.582	.573	.564	.555	.546	.537	.528	.519	.510	.503	.495	.488	.481	.474	.467	.460	.453	.446	.439	.432	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.348	.342	.336	.330	.324	.318	.312	.306	.300																									
.68	.672	.663	.655	.647	.639	.631	.622	.613	.604	.595	.586	.577	.568	.559	.550	.541	.532	.523	.514	.507	.499	.492	.485	.478	.471	.464	.457	.450	.443	.436	.430	.424	.418	.412	.406	.400	.394	.388	.382	.376	.370	.364	.358	.352	.346	.340	.334	.328	.322	.316	.310	.304	.298																								
.69	.676	.667	.659	.651	.643	.635	.626	.617	.608	.599	.590	.581	.572	.563	.554	.545	.536	.527	.518	.510	.503	.495	.488	.481	.474	.467	.460	.453	.446	.439	.432	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.348	.342	.336	.330	.324	.318	.312	.306	.300																								
.70	.680	.671	.663	.655	.647	.639	.630	.621	.612	.603	.594	.585	.576	.567	.558	.549	.540	.531	.522	.513	.506	.498	.491	.484	.477	.470	.463	.456	.449	.442	.436	.430	.424	.418	.412	.406	.400	.394	.388	.382	.376	.370	.364	.358	.352	.346	.340	.334	.328	.322	.316	.310	.304	.298																							
.71	.684	.675	.667	.659	.651	.643	.634	.625	.616	.607	.598	.589	.580	.571	.562	.553	.544	.535	.526	.517	.510	.502	.495	.488	.481	.474	.467	.460	.453	.446	.439	.432	.426	.420	.414	.408	.402	.396	.390	.384	.378	.372	.366	.360	.354	.348	.342	.336	.330	.324	.318	.312	.306	.300																							
.72	.688	.679	.671	.663	.655	.647	.638	.629	.620	.611	.602	.593	.584	.575	.566	.557	.548	.539	.530	.521	.512	.504	.497	.490	.483	.476	.469	.462	.455	.448	.441	.434	.427	.421	.415	.409	.403	.397	.391	.385	.379	.373	.367	.361	.355	.349	.343	.337	.331	.325	.319	.313	.307	.301	.295																						
.73	.692	.683	.675	.667	.659	.651	.642	.633	.624	.615	.606	.597	.588	.579	.570	.561	.552	.543	.534	.525	.516	.508	.501	.494	.487	.480	.473	.466	.459	.452	.445	.438	.431	.424	.417	.411	.405	.399	.393	.387	.381	.375	.369	.363	.357	.351	.345	.339	.333	.327	.321	.315	.309	.303	.297	.291	.285																				
.74	.696	.687	.679	.671	.663	.655	.646	.637	.628	.619	.610	.601	.592	.583	.574	.565	.556	.547	.538	.529	.520	.511	.502	.493	.484	.475	.466	.457	.448	.439	.430	.421	.412	.403	.394	.385	.376	.367	.358	.349	.340	.331	.322	.313	.304	.295	.286	.277	.268	.259	.250	.241	.232	.223	.214	.205	.196	.187	.178	.169	.160	.151	.142	.133	.124	.115	.106	.097	.088	.079	.070	.061	.052	.043	.034	.025	.016</

TABLE V
 T_a

	.69	.70	.71	.72	.73	.74	.75	.76	.77	.78	.79																										
.57	491 484 477 470 463 456 450 442 435 428 421 414 407 400 393 387 381 375 369 363 357 351 346 340 334 328 323 318 312 307 302 297 292 286 281 276 271 266 262 258 254 250 246 241 237 233 229 225 221 216	494 487 480 473 466 459 452 445 437 430 423 416 409 402 395 389 383 377 371 365 359 353 348 342 336 330 325 320 314 309 304 299 294 288 283 277 272 267 263 259 255 251 247 242 238 234 230 226 222 217	498 490 483 476 469 462 454 447 439 432 425 418 411 404 397 391 385 379 373 367 361 355 350 344 338 332 326 322 316 311 306 301 295 289 283 278 273 268 264 260 256 252 248 243 239 235 230 226 222 218	502 493 486 479 472 465 458 451 444 437 430 423 416 409 403 397 391 385 379 373 367 361 355 350 344 338 332 326 322 316 311 306 300 294 288 283 278 273 268 264 260 256 252 248 244 240 236 232 228 224 220 216	506 497 490 482 475 468 461 454 447 440 433 426 419 412 405 399 393 387 381 375 369 363 357 352 346 340 334 328 322 316 311 305 299 293 287 282 277 272 267 263 258 254 250 245 241 236 232 228 224 220 216	.58	510 503 494 486 478 471 464 457 450 443 436 429 422 415 408 402 396 390 384 378 372 366 360 354 348 342 336 330 324 318 313 308 303 297 291 286 281 276 271 266 262 258 254 250 245 241 236 232 228 224 220 216	514 506 498 490 482 474 467 460 453 446 439 432 425 418 411 404 398 392 386 380 374 368 362 356 350 344 338 332 326 320 314 310 305 299 293 287 282 277 272 267 263 258 254 250 245 241 236 232 228 224 220 216	518 510 502 494 486 477 469 462 454 446 438 430 423 416 409 403 397 391 385 379 373 367 361 355 350 344 338 332 326 320 314 310 305 299 293 287 282 277 272 267 263 258 254 249 244 239 235 231 227 223 219 215 211	524 515 506 498 489 480 472 465 457 449 441 433 426 419 412 406 400 393 386 380 374 368 362 356 350 344 338 332 326 320 314 310 305 299 293 287 282 277 272 267 263 258 254 249 244 239 235 231 227 223 219 215 211	529 520 511 502 493 484 475 468 460 452 445 437 430 422 415 409 403 396 389 382 376 370 364 358 352 346 340 334 328 322 316 311 306 300 294 288 283 278 273 268 264 260 256 252 248 244 240 236 232 228 224 220 216 212	534 525 516 506 497 488 479 471 463 456 448 441 434 426 419 412 406 399 392 385 378 372 366 360 354 348 342 336 330 324 318 313 308 302 297 292 287 282 277 272 267 263 258 254 248 243 238 234 230 226 222 218 214	.59	540 530 520 510 501 492 483 474 467 460 452 445 438 430 423 416 409 402 395 388 381 374 368 362 356 350 344 338 332 326 320 314 310 304 299 294 289 284 279 274 269 264 260 256 252 248 244 240 236 232 228 224 220 216	543 533 524 514 505 496 487 478 471 463 455 448 441 433 426 419 412 404 397 390 384 376 371 364 358 352 346 340 334 328 322 316 312 305 300 295 290 285 280 275 270 265 261 256 251 246 241 237 233 229 225 221 217	547 537 528 518 509 500 491 482 475 466 458 451 445 436 429 422 415 407 399 392 387 379 374 366 360 354 348 342 336 330 324 318 314 307 302 297 292 287 282 277 272 267 263 258 254 247 243 239 234 230 226 222 218 214	551 541 532 522 513 504 495 486 479 470 462 454 448 439 432 424 417 410 402 395 390 382 376 369 362 356 350 344 338 332 326 320 314 310 304 299 293 288 282 277 272 267 263 258 254 247 243 239 234 230 226 222 218 214	555 545 536 526 517 508 499 491 483 474 466 458 451 442 435 427 419 412 405 398 392 385 379 372 365 358 352 346 340 334 328 322 317 311 305 300 295 290 284 279 274 269 264 260 254 249 245 241 236 232 228 224 220	.60	559 549 540 531 522 513 504 496 487 478 470 462 454 446 438 430 422 415 408 401 394 388 382 375 368 362 356 350 344 338 332 326 320 314 310 304 299 293 288 282 277 272 267 263 258 254 247 243 239 234 230 226 222 218 214	564 554 545 534 526 517 508 500 491 482 473 465 457 449 441 433 425 418 411 404 396 390 385 377 370 363 356 350 344 338 332 326 320 314 310 304 299 293 288 282 277 272 267 263 258 254 247 243 239 234 230 226 222 218 214	569 559 550 540 531 521 512 504 495 486 477 468 460 452 445 436 428 422 414 407 399 392 388 379 372 365 358 352 346 340 334 328 322 317 311 306 300 295 290 284 279 274 269 264 260 254 250 246 241 236 232 228 224 220	574 564 555 544 536 525 516 508 499 490 481 472 464 455 449 439 431 425 417 410 402 395 390 381 374 367 360 355 448 342 337 330 326 319 313 308 302 297 292 287 282 277 272 267 263 258 254 250 246 241 236 232 228 224 220	.61	579 569 560 549 540 530 520 512 503 494 485 476 468 459 452 443 435 428 420 413 405 398 392 384 377 370 363 357 351 345 340 333 328 321 315 310 304 299 293 287 282 277 272 267 263 258 254 250 246 241 236 232 228 224 220 216	599 587 577 566 555 545 535 525 515 506 497 488 479 470 462 453 445 438 430 422 414 407 399 392 385 378 371 365 358 352 346 340 334 328 322 317 311 305 300 295 290 284 279 274 269 264 260 254 250 246 241 236 232 228 224 220	606 594 583 572 560 550 540 530 520 510 501 492 483 474 466 457 448 442 433 425 417 410 402 395 389 382 375 368 362 356 350 344 338 332 326 320 314 310 304 299 293 287 282 277 272 267 263 258 254 250 246 241 236 232 228 224 220	613 603 593 582 570 568 556 545 535 525 515 505 496 487 478 470 461 452 445 436 428 420 413 406 398 391 384 377 371 364 357 350 344 338 332 326 320 314 310 304 299 293 287 282 277 272 267 263 258 254 250 246 241 236 232 228 224 220	.62	620 606 596 584 572 561 550 539 529 519 509 500 491 482 473 464 456 448 440 432 424 416 408 401 394 387 380 373 366 360 354 348 342 336 330 324 318 313 307 301 295 289 284 279 274 269 264 260 254 250 246 241 236 232 228 224 220	626 606 596 584 572 561 550 539 529 519 509 500 491 482 473 464 456 448 440 432 424 416 408 401 394 387 380 373 366 360 354 348 342 336 330 324 318 313 307 301 295 289 284 279 274 269 264 260 254 250 246 241 236 232 228 224 220	636 623 610 598 586 575 563 551 541 531 521 510 501 492 482 473 464 456 448 440 432 424 416 408 401 394 387 380 373 366 360 354 348 342 336 330 324 318 313 307 301 295 289 284 279 274 269 264 260 254 250 246 241 236 232 228 224 220	.63	652 639 626 613 600 589 577 565 554 543 533 522 511 502 492 483 474 465 456 448 439 430 421 413 406 399 392 385 378 371 364 357 350 344 338 332 326 320 314 310 304 299 293 287 282 277 272 267 263 258 254 250 246 241 236 232 228 224 220	660 647 634 621 608 596 584 572 561 550 539 528 517 507 497 488 479 470 461 452 445 434 425 417 409 402 395 388 381 374 367 360 353 346 340 334 328 322 316 310 304 298 292 286 281 276 271 266 261 255 250 245 240 235	668 655 641 628 615 603 590 578 567 556 545 531 522 512 502 493 484 475 465 456 447 438 428 420 412 405 398 391 384 377 370 363 356 349 343 337 331 325 319 313 306 300 294 288 283 278 273 268 262 257 252 247 242 237	676 663 649 636 622 610 597 585 574 562 551 537 528 517 507 498 489 480 469 460 451 442 432 423 415 408 401 394 387 380 373 366 359 352 346 339 333 327 321 315 308 302 296 290 285 280 275 270 264 259 254 249 244

TABLE VI
 T_a

.74	.75	.76	.77	.78	.79	.80	.81	.82	.83	.84																						
406 398 390 382 374 367 360 353 346 339 334 329 322 316 310 304 298 292 286 281 276 271 265 260 255 250 245 241 236 231 226 221 216 211 206 202 198 194 190 186 182	409 401 393 385 377 370 363 356 349 342 337 331 324 318 312 306 300 294 288 283 277 272 266 261 256 251 246 242 237 230 227 223 217 212 207 203 199 195 191 187 183	412 404 396 388 380 373 366 359 352 345 339 333 326 320 314 308 302 296 290 284 279 274 268 263 258 253 248 243 238 233 228 223 218 213 208 204 200 196 192 188 184 180	415 407 399 391 383 376 369 362 355 348 341 335 328 322 316 310 304 298 292 286 281 275 270 264 259 254 249 244 239 234 229 224 219 214 209 205 201 197 193 189 185 181	419 410 402 394 386 379 372 365 358 351 344 337 330 324 318 312 306 300 294 288 283 277 271 266 261 256 251 245 240 235 230 225 221 216 211 207 203 199 195 191 187 182 178	423 414 405 397 389 382 375 368 361 354 347 340 333 326 320 314 308 302 296 290 285 279 273 268 263 257 252 247 242 237 232 227 222 217 212 208 204 200 196 192 188 183 179	427 418 409 401 393 385 378 371 364 357 350 343 336 329 323 317 311 304 298 292 287 281 275 269 264 259 254 248 243 238 233 228 223 218 213 209 205 201 197 193 189 184 180 176	431 422 413 405 397 389 381 374 367 360 353 346 339 332 326 320 314 307 301 295 289 283 277 271 266 261 256 251 246 241 236 231 226 221 216 212 208 203 199 195 191 187 183 179 174	434 426 417 409 400 392 384 377 370 363 356 348 341 334 328 322 316 310 304 298 292 287 281 275 269 264 259 254 248 243 238 233 228 223 218 214 210 205 200 196 192 188 184 180 175	437 430 421 413 404 396 388 380 373 366 359 351 344 337 330 324 318 311 306 299 293 287 281 275 269 264 259 254 248 243 238 233 228 223 218 214 210 205 200 196 192 188 184 180 175	441 433 424 416 408 400 392 384 377 370 362 354 347 340 333 326 320 314 308 302 296 290 283 277 272 266 261 256 251 246 241 236 231 226 221 216 212 208 203 199 195 191 187 183 179 174	445 437 428 420 412 404 396 388 381 372 365 357 350 343 336 329 324 317 311 304 298 292 285 279 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 190 186 182 178 174	449 441 432 424 416 408 400 392 384 376 368 360 353 346 339 332 326 320 314 308 292 285 279 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 190 186 182 178 174	454 446 436 428 420 412 404 396 388 379 371 363 356 349 342 335 328 322 315 308 302 296 290 283 277 272 266 261 256 251 246 241 236 231 226 221 216 212 208 203 199 195 191 187 183 179 174	459 451 441 432 424 416 408 400 391 383 374 365 358 351 344 337 330 323 316 309 302 296 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 208 203 199 195 191 187 183 179 174	464 456 446 437 428 420 412 404 395 386 377 369 362 355 348 341 334 327 320 313 306 300 294 288 282 276 270 264 258 253 247 243 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	469 461 451 442 433 424 416 408 400 391 383 374 365 358 351 344 337 330 323 316 309 302 296 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 208 203 199 195 191 187 183 179 174	474 466 456 447 438 429 420 411 402 393 385 377 369 361 354 347 340 333 326 320 314 308 292 286 280 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	481 472 461 452 443 434 424 415 406 397 389 381 372 364 357 350 343 336 329 322 315 308 301 294 288 282 276 270 264 258 253 247 243 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	487 478 467 457 448 437 428 419 410 401 393 385 376 368 360 353 346 339 332 325 318 311 304 297 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	493 484 473 462 453 442 432 423 414 405 397 389 380 372 364 356 349 342 335 328 321 314 307 300 293 287 280 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	500 490 479 468 458 447 437 428 419 410 401 393 384 376 368 360 352 345 338 331 324 317 310 303 296 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	515 503 492 480 469 458 447 438 429 419 410 401 392 384 376 368 360 353 346 339 332 325 318 311 304 297 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	523 510 499 487 475 464 452 443 434 424 414 405 396 388 378 370 362 354 347 340 333 326 320 314 308 292 286 279 273 267 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	531 518 506 494 481 470 458 448 439 429 419 409 392 382 373 365 357 350 343 336 329 322 315 308 301 294 288 282 276 270 264 258 253 247 243 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	539 526 513 501 488 476 464 453 444 434 424 414 404 396 386 377 369 360 353 346 339 332 325 318 311 304 297 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	547 534 521 508 495 482 470 459 449 439 429 419 409 390 381 372 364 356 349 342 335 328 321 314 307 300 293 287 280 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	556 543 529 516 502 489 476 465 455 444 434 424 414 404 394 385 376 368 360 352 345 338 331 324 317 310 303 296 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	566 552 537 524 509 496 482 471 461 449 439 429 419 409 399 389 380 372 364 356 349 342 335 328 321 314 307 300 293 286 280 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	576 561 546 532 517 503 489 477 467 455 444 434 424 414 404 394 385 376 368 360 351 342 335 328 321 314 307 300 293 286 280 274 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	586 570 555 540 525 510 496 484 473 461 449 439 429 419 409 399 390 381 372 364 355 346 338 331 323 315 308 301 294 287 281 275 268 263 257 252 247 242 237 232 227 222 217 212 207 202 198 194 189 185 181 177 173	596 580 564 548 533 518 503 491 479 467 455 444 434 424 414 404 395 386 377 368 359 350 342 334 326 318 311 304 297 290 284 278 272 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173	606 590 573 556 541 525 510 498 485 473 461 449 439 429 419 409 400 391 382 372 361 354 346 338 330 321 314 307 300 293 287 281 274 266 261 256 251 246 241 236 231 226 221 216 212 207 202 198 194 189 185 181 177 173

TABLE VII
 T_a

T_b	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88
	316	309	302	295	288	281	274	267	261	258
	320	313	306	298	291	284	277	270	264	260
	324	316	309	301	294	287	280	273	267	262
.71	328	320	312	304	297	290	283	276	270	265
	332	323	315	307	300	293	286	279	273	268
	336	327	318	310	303	296	289	282	276	271
	340	331	322	314	306	299	292	285	279	274
	344	335	326	318	310	303	295	288	282	277
.72	348	339	330	322	314	306	299	292	285	277
	352	343	334	326	317	309	302	295	288	280
	356	347	338	330	321	312	305	298	291	283
	360	351	342	334	325	316	308	301	294	286
	364	355	346	338	329	320	312	304	297	289
.73	368	359	350	342	333	324	316	308	300	292
	372	363	354	346	337	328	319	311	303	295
	376	367	358	350	341	332	323	314	306	298
	380	371	362	354	345	336	327	318	309	301
	384	375	366	358	349	340	331	322	313	305
	388	379	370	362	353	344	335	326	317	309
.74	392	383	374	366	357	348	339	330	321	313
	396	387	378	370	361	352	343	334	325	317
	400	391	382	374	365	356	347	338	329	321
	404	395	386	378	369	360	351	342	333	325
	408	399	390	382	373	364	355	346	337	329
	412	403	394	386	377	368	359	350	341	333
.75	416	407	398	390	381	372	363	354	345	337
	420	411	402	394	385	376	367	358	349	341
	424	415	406	398	389	380	371	362	353	345
	428	419	410	402	393	384	375	366	357	349
.76	432	423	414	406	397	388	379	370	361	353
	436	427	418	410	401	392	383	374	365	357
	440	431	422	414	405	396	387	378	369	361
	444	435	426	418	409	400	391	382	373	365
	448	439	430	422	413	404	395	386	377	369
.77	452	443	434	426	417	408	399	390	381	373
	456	447	438	430	421	412	403	394	385	377
	460	451	442	434	425	416	407	398	389	381
	464	455	446	438	429	420	411	402	393	385
	468	459	450	442	433	424	415	406	397	389
	472	463	454	446	437	428	419	410	401	393
	476	467	458	450	441	432	423	414	405	397
	480	471	462	454	445	436	427	418	409	401
	484	475	466	458	449	440	431	422	413	405
	488	479	470	462	453	444	435	426	417	409
	492	483	474	466	457	448	439	430	421	413
	496	487	478	470	461	452	443	434	425	417
	500	491	482	474	465	456	447	438	429	421
	504	495	486	478	469	460	451	442	433	425
	508	499	490	482	473	464	455	446	437	429
	512	503	494	486	477	468	459	450	441	433
	516	507	498	490	481	472	463	454	445	437
	520	511	502	494	485	476	467	458	449	441
	524	515	506	498	489	480	471	462	453	445
	528	519	510	502	493	484	475	466	457	449
	532	523	514	506	497	488	479	470	461	453
	536	527	518	510	501	492	483	474	465	457
	540	531	522	514	505	496	487	478	469	461
	544	535	526	518	509	500	491	482	473	465
	548	539	530	522	513	504	495	486	477	469
	552	543	534	526	517	508	499	490	481	473
	556	547	538	530	521	512	503	494	485	477
	560	551	542	534	525	516	507	498	489	481
	564	555	546	538	529	520	511	502	493	485
	568	559	550	542	533	524	515	506	497	489
	572	563	554	546	537	528	519	510	501	493
	576	567	558	550	541	532	523	514	505	497
	580	571	562	554	545	536	527	518	509	501
	584	575	566	558	549	540	531	522	513	505
	588	579	570	562	553	544	535	526	517	509
	592	583	574	566	557	548	539	530	521	513
	596	587	578	570	561	552	543	534	525	517
	600	591	582	574	565	556	547	538	529	521
	604	595	586	578	569	560	551	542	533	525
	608	599	590	582	573	564	555	546	537	529
	612	603	594	586	577	568	559	550	541	533
	616	607	598	590	581	572	563	554	545	537
	620	611	602	594	585	576	567	558	549	541
	624	615	606	598	589	580	571	562	553	545
	628	619	610	602	593	584	575	566	557	549
	632	623	614	606	597	588	579	570	561	553
	636	627	618	610	601	592	583	574	565	557
	640	631	622	614	605	596	587	578	569	561
	644	635	626	618	609	600	591	582	573	565
	648	639	630	622	613	604	595	586	577	569
	652	643	634	626	617	608	599	590	581	573
	656	647	638	630	621	612	603	594	585	577
	660	651	642	634	625	616	607	598	589	581
	664	655	646	638	629	620	611	602	593	585
	668	659	650	642	633	624	615	606	597	589
	672	663	654	646	637	628	619	610	601	593
	676	667	658	650	641	632	623	614	605	597
	680	671	662	654	645	636	627	618	609	601
	684	675	666	658	649	640	631	622	613	605
	688	679	670	662	653	644	635	626	617	609
	692	683	674	666	657	648	639	630	621	613
	696	687	678	670	661	652	643	634	625	617
	700	691	682	674	665	656	647	638	629	621
	704	695	686	678	669	660	651	642	633	625
	708	699	690	682	673	664	655	646	637	629
	712	703	694	686	677	668	659	650	641	633
	716	707	698	690	681	672	663	654	645	637
	720	711	702	694	685	676	667	658	649	641
	724	715	706	698	689	680	671	662	653	645
	728	719	710	702	693	684	675	666	657	649
	732	723	714	706	697	688	679	670	661	653
	736	727	718	710	701	692	683	674	665	657
	740	731	722	714	705	696	687	678	669	661
	744	735	726	718	709	700	691	682	673	665
	748	739	730	722	713	704	695	686	677	669
	752	743	734	726	717	708	699	690	681	673
	756	747	738	730	721	712	703	694	685	677
	760	751	742	734	725	716	707	698	689	681
	764	755	746	738	729	720	711	702	693	685
	768	759	750	742	733	724	715	706	697	689
	772	763	754	746	737	728	719	710	701	693
	776	767	758	750	741	732	723	714	705	697
	780	771	762	754	745	736	727	718	709	701
	784	775	766	758	749	740	731	722	713	705
	788	779	770	762	753	744	735	726	717	709
	792	783	774							

TABLE VIII

T_a	.83	.84	.85	.86	.87	.89	.90	.91	.92	.93
.77	274 266 258 250 242 234 227 220 214 208 202 196 190 184 178 173 168 163 158 153 148 143 138 134 130 126									
	281 273 264 256 248 240 232 225 218 212 206 199 193 187 181 176 171 165 160 155 150 145 140 136 132 127 122 118									
.78	288 280 271 262 254 245 237 230 223 216 210 203 197 191 185 179 174 169 163 158 153 148 143 138 134 129 124 120 116									
	296 287 278 269 260 251 243 235 228 221 214 207 201 195 189 183 177 171 166 161 156 151 146 141 136 131 126 122 118 114 110									
	304 295 285 276 267 257 249 241 232 226 219 212 205 199 192 186 180 174 169 164 158 153 148 143 138 133 128 124 119 115 111									
.79	313 303 293 283 274 264 255 247 238 231 224 217 210 203 196 190 184 178 172 167 161 156 151 146 141 136 130 126 121 117 113 109									
	322 311 301 291 281 271 262 253 245 237 229 222 215 208 201 194 188 182 176 170 164 158 153 148 143 138 133 128 123 119 115 111 107									
	333 322 312 300 290 279 270 260 252 243 235 228 220 213 206 198 191 184 178 172 165 159 154 149 143 138 133 128 124 119 115 111 108									
.80	345 333 322 310 299 287 278 268 259 250 241 234 226 218 211 203 196 190 183 176 170 164 159 153 148 143 138 133 128 123 119 114 110 106									
	357 345 333 320 308 296 286 276 266 257 248 240 232 224 216 208 201 194 187 180 174 168 162 156 151 146 141 136 131 126 121 116 112 108 104 100									
	366 296 285 274 265 255 246 238 232 221 213 206 198 191 184 178 172 165 159 154 149 143 138 133 128 123 118 114 109 105 101.5									
.81	370 260 251 242 233 224 216 208 201 194 187 180 173 167 161 155 149 143 138 133 128 123 118 114 109 105 101.5									
	280 270 260 251 241 231 223 215 207 199 192 184 177 171 165 158 152 146 141 136 130 125 120 115 111 107 103 98									
	291 280 270 260 249 239 230 222 213 205 197 189 182 175 169 162 156 150 144 139 133 128 123 118 113 109.6									
.82	265 246 236 227 217 208 200 196 185 178 171 164 158 152 145 139 134 129 123 118 114									
	274 263 252 241 230 220 210 201 192 184 177 169 162 156 149 143 137 132 126 121 117									
.83	265 254 244 234 223 214 206 198 190 183 176 169 162 156 149 143 137 132 126 121 117									
	229 220 212 203 194 186 179 171 164 158 152 145 139 134 129 123 118 114									
.84	238 229 220 210 201 192 184 177 169 161 155 148 142 136 130 125									
	206 197 188 180 172 164 157 150 144 138 132 127 121									
.85	214 204 195 186 178 169 162 155 148 142 136 130 125									
	206 197 188 180 172 164 157 150 144 138 131									
	222 212 202 193 184 174 166 159 152 146 140 134 128									
	182 173 166 158 151 143									
.86	189 180 172 163 156 148									
	196 187 178 169 161 153									
.87	207 197 187 177 168 158									
	218 207 196 185 175 166									
	230 218 206 194 183 172									
.88	179									
	191									
	201									
	190 179 169 159 149									
	141 133 125 118 111									
	105 96 87 82.2									