

**Normal Tables.** Entries represent the area under the standardized normal distribution from  $-\infty$  to  $z$ ,  $P[Z \leq z]$ . The value of  $z$  to the first decimal is given in the left column. The second decimal place is given in the top row.

$z$	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Selected points of the normal distribution

$\Phi(x)$	0.800	0.850	0.900	0.950	0.975	0.990	0.995
$x$	0.8416212	1.0364334	1.2815516	1.6448536	1.9599640	2.3263479	2.5758293

Table 1: Life Table for the total population in United States, 2004 (from <http://www.cdc.gov/>).  $\overset{\circ}{e}_x$  was found using linear interpolation.

Age	$\ell_x$	$1000q_x$	$\overset{\circ}{e}_x$	Age	$\ell_x$	$1000q_x$	$\overset{\circ}{e}_x$	Age	$\ell_x$	$1000q_x$	$\overset{\circ}{e}_x$
0	100000	6.800	77.8370	40	96517	1.948	39.8550	80	53925	54.483	9.1413
1	99320	0.483	77.3665	41	96329	2.107	38.9318	81	50987	59.760	8.6392
2	99272	0.292	76.4036	42	96126	2.289	38.0130	82	47940	65.436	8.1565
3	99243	0.232	75.4258	43	95906	2.492	37.0990	83	44803	71.602	7.6926
4	99220	0.181	74.4432	44	95667	2.728	36.1904	84	41595	78.519	7.2473
5	99202	0.171	73.4566	45	95406	2.977	35.2881	85	38329	85.888	6.8223
6	99185	0.161	72.4691	46	95122	3.248	34.3919	86	35037	93.901	6.4163
7	99169	0.151	71.4807	47	94813	3.523	33.5024	87	31747	102.561	6.0294
8	99154	0.141	70.4914	48	94479	3.800	32.6191	88	28491	111.860	5.6613
9	99140	0.111	69.5013	49	94120	4.091	31.7416	89	25304	121.917	5.3114
10	99129	0.111	68.5090	50	93735	4.395	30.8699	90	22219	132.724	4.9795
11	99118	0.111	67.5165	51	93323	4.758	30.0040	91	19270	144.318	4.6650
12	99107	0.151	66.5240	52	92879	5.114	29.1450	92	16489	156.711	4.3674
13	99092	0.222	65.5340	53	92404	5.487	28.2923	93	13905	169.939	4.0861
14	99070	0.343	64.5484	54	91897	5.876	27.4456	94	11542	183.937	3.8203
15	99036	0.454	63.5704	55	91357	6.294	26.6049	95	9419	198.960	3.5687
16	98991	0.586	62.5991	56	90782	6.752	25.7702	96	7545	214.579	3.3309
17	98933	0.677	61.6355	57	90169	7.286	24.9420	97	5926	231.185	3.1043
18	98866	0.769	60.6769	58	89512	7.898	24.1214	98	4556	248.683	2.8874
19	98790	0.820	59.7232	59	88805	8.637	23.3095	99	3423	269.674	2.6776
20	98709	0.871	58.7718	60	88038	9.485	22.5082	100	2500	291.200	2.4816
21	98623	0.923	57.8226	61	87203	10.458	21.7189	101	1772	314.898	2.2957
22	98532	0.964	56.8755	62	86291	11.438	20.9432	102	1214	339.374	2.1211
23	98437	0.975	55.9300	63	85304	12.426	20.1797	103	802	366.584	1.9539
24	98341	0.966	54.9841	64	84244	13.413	19.4273	104	508	395.669	1.7953
25	98246	0.957	54.0367	65	83114	14.474	18.6847	105	307	429.967	1.6433
26	98152	0.958	53.0880	66	81911	15.700	17.9517	106	175	462.857	1.5057
27	98058	0.948	52.1384	67	80625	17.079	17.2301	107	94	500.000	1.3723
28	97965	0.960	51.1874	68	79248	18.625	16.5208	108	47	531.915	1.2447
29	97871	0.971	50.2361	69	77772	20.329	15.8249	109	22	590.909	1.0909
30	97776	0.992	49.2845	70	76191	22.102	15.1429	110	9	666.667	0.9444
31	97679	1.024	48.3329	71	74507	24.025	14.4738	111	3	666.667	0.8333
32	97579	1.066	47.3819	72	72717	26.211	13.8178	112	1	1000.000	0.5000
33	97475	1.118	46.4319	73	70811	28.738	13.1763	113	0		
34	97366	1.191	45.4834	74	68776	31.566	12.5513	114	0		
35	97250	1.275	44.5370	75	66605	34.427	11.9442	115	0		
36	97126	1.369	43.5932	76	64312	37.380	11.3522	116	0		
37	96993	1.495	42.6523	77	61908	40.754	10.7736	117	0		
38	96848	1.631	41.7154	78	59385	44.759	10.2101	118	0		
39	96690	1.789	40.7828	79	56727	49.394	9.6651	119	0		

Table 2: Single benefit premiums using  $i = 6\%$  and the life table for the USA population in 2004.

Age	$1000A_x$	$1000 \cdot {}^2A_x$	Age	$1000A_x$	$1000 \cdot {}^2A_x$	Age	$1000A_x$	$1000 \cdot {}^2A_x$
0	25.56509	8.80028	40	132.64232	36.48695	80	602.29000	398.78023
1	20.43797	3.10914	41	138.92362	39.12511	81	617.59267	416.26584
2	21.19120	3.01160	42	145.45820	41.94200	82	632.69815	433.88508
3	22.17703	3.09261	43	152.24547	44.94022	83	647.60043	451.63017
4	23.28129	3.24385	44	159.28512	48.12273	84	662.27452	469.46404
5	24.50120	3.46401	45	166.56845	51.48294	85	676.61946	487.22737
6	25.80432	3.72143	46	174.10407	55.03330	86	690.64692	504.92794
7	27.19565	4.02073	47	181.89272	58.77789	87	704.32128	522.49937
8	28.68047	4.36710	48	189.95271	62.74114	88	717.61936	539.89113
9	30.26438	4.76635	49	198.30360	66.95055	89	730.53409	557.07628
10	31.97284	5.24510	50	206.95786	71.42730	90	743.03797	573.99323
11	33.78399	5.78307	51	215.92905	76.19525	91	755.11854	590.60171
12	35.70401	6.38759	52	225.19854	81.24183	92	766.76587	606.86359
13	37.70061	7.02680	53	234.79707	86.61209	93	777.97875	622.75341
14	39.74945	7.67501	54	244.74096	92.33720	94	788.75951	638.25042
15	41.80558	8.28329	55	255.04797	98.45246	95	799.13939	653.38239
16	43.87947	8.85675	56	265.72936	104.98798	96	809.10797	668.10721
17	45.95325	9.37102	57	276.78968	111.96812	97	818.76523	682.57177
18	48.06577	9.85873	58	288.21074	119.39098	98	828.16570	696.85524
19	50.21961	10.31648	59	299.97432	127.25443	99	837.42633	711.15592
20	52.45587	10.78051	60	312.03085	135.51662	100	846.20037	724.86583
21	54.77970	11.25154	61	324.34442	144.14912	101	854.64503	738.23257
22	57.19655	11.73035	62	336.86984	153.10886	102	862.68274	751.09985
23	59.72177	12.22786	63	349.64322	162.45322	103	870.49210	763.76315
24	62.39068	12.77643	64	362.70266	172.24665	104	877.99753	776.07824
25	65.23111	13.40252	65	376.09614	182.57183	105	885.29025	788.19794
26	68.25350	14.11580	66	389.83025	193.46383	106	891.94945	799.34341
27	71.45945	14.91710	67	403.86070	204.89280	107	898.47471	810.37122
28	74.86961	15.82745	68	418.15497	216.84194	108	904.76640	821.06620
29	78.47756	16.84035	69	432.67785	229.28906	109	912.52099	834.53860
30	82.29543	17.96859	70	447.40501	242.22463	110	919.99884	847.68072
31	86.32673	19.21651	71	462.36634	255.71311	111	925.59630	857.36218
32	90.57530	20.58899	72	477.55684	269.77592	112	943.39623	889.99644
33	95.04531	22.09153	73	492.91905	284.36250			
34	99.74133	23.73035	74	508.36536	299.37481			
35	104.65912	25.50242	75	523.83660	314.74666			
36	109.80361	27.41441	76	539.41014	330.60416			
37	115.18019	29.47383	77	555.14598	347.05975			
38	120.77661	31.66919	78	570.97004	364.03834			
39	126.59832	34.00756	79	586.73082	381.34315			

Table 3: Single benefit premiums using  $i = 6\%$  and the life table for the USA population in 2004.

Age	$\ddot{a}_x$	$1000 \cdot {}_5E_x$	Age	$\ddot{a}_x$	$1000 \cdot {}_5E_x$	Age	$\ddot{a}_x$	$1000 \cdot {}_5E_x$
0	17.215017	741.295053	40	15.323319	738.656540	80	7.026210	531.138776
1	17.305596	746.242468	41	15.212349	737.895046	81	6.755863	513.497256
2	17.292289	746.482853	42	15.096905	737.051257	82	6.488999	494.852007
3	17.274873	746.588040	43	14.976997	736.139605	83	6.225726	475.194353
4	17.255364	746.655667	44	14.852630	735.174504	84	5.966483	454.588792
5	17.233812	746.708286	45	14.723957	734.170229	85	5.713056	433.179299
6	17.210790	746.753396	46	14.590828	733.125612	86	5.465238	410.984530
7	17.186210	746.790991	47	14.453229	732.015566	87	5.223657	388.116673
8	17.159978	746.790920	48	14.310835	730.846476	88	4.988725	364.698498
9	17.131996	746.730555	49	14.163303	729.608843	89	4.760564	340.849424
10	17.101813	746.557117	50	14.010411	728.300687	90	4.539662	316.775045
11	17.069816	746.300710	51	13.851920	726.911816	91	4.326239	292.582403
12	17.035896	745.946228	52	13.688159	725.454863	92	4.120470	268.557944
13	17.000623	745.553895	53	13.518585	723.870975	93	3.922375	244.840578
14	16.964426	745.146209	54	13.342910	722.115652	94	3.731915	221.613648
15	16.928101	744.790854	55	13.160819	720.110282	95	3.548537	198.337980
16	16.891463	744.480233	56	12.972115	717.798181	96	3.372426	175.499202
17	16.854826	744.229350	57	12.776716	715.119997	97	3.201814	153.083264
18	16.817505	744.015665	58	12.574944	712.129225	98	3.035739	131.541057
19	16.779454	743.861889	59	12.367120	708.879202	99	2.872135	110.898963
20	16.739946	743.753117	60	12.154122	705.463729	100	2.717127	91.763304
21	16.698892	743.689445	61	11.936582	701.910074	101	2.567938	73.798070
22	16.656194	743.663398	62	11.715300	698.192050	102	2.425938	57.860188
23	16.611582	743.675111	63	11.489636	694.207958	103	2.287973	43.791938
24	16.564431	743.686811	64	11.258920	689.850466	104	2.155377	32.361574
25	16.514250	743.683357	65	11.022302	685.015129	105	2.026539	21.906591
26	16.460855	743.657094	66	10.779666	679.712916	106	1.908893	12.810140
27	16.404216	743.607918	67	10.531794	673.964311	107	1.793613	7.949555
28	16.343970	743.520547	68	10.279262	667.702636	108	1.682460	0.000000
29	16.280230	743.402430	69	10.022691	660.821737	109	1.545462	0.000000
30	16.212781	743.238190	70	9.762512	653.241598	110	1.413354	0.000000
31	16.141561	743.027645	71	9.498195	645.008759	111	1.314465	0.000000
32	16.066503	742.770596	72	9.229829	636.182172	112	1.000000	0.000000
33	15.987533	742.451496	73	8.958430	626.681259			
34	15.904570	742.070053	74	8.685545	616.344573			
35	15.817689	741.625882	75	8.412220	604.998078			
36	15.726803	741.126295	76	8.137088	592.431466			
37	15.631817	740.578589	77	7.859088	578.657957			
38	15.532947	739.989905	78	7.579529	563.768762			
39	15.430096	739.352028	79	7.301089	547.926097			

Table 4: Single benefit premiums using  $i = 6\%$  and the life table for the USA population in 2004.

Age	$1000 \cdot {}_{10}E_x$	$1000 \cdot {}_{20}E_x$	Age	$1000 \cdot {}_{10}E_x$	$1000 \cdot {}_{20}E_x$	Age	$1000 \cdot {}_{10}E_x$	$1000 \cdot {}_{20}E_x$
0	553.531158	307.779328	40	542.299641	284.412741	80	230.078323	14.455481
1	557.259097	309.616568	41	540.969757	282.265025	81	211.039429	10.836448
2	557.466669	309.480451	42	539.532993	279.902853	82	192.060314	7.895931
3	557.545169	309.272411	43	538.005036	277.336042	83	173.302667	5.581488
4	557.550600	309.042417	44	536.389819	274.574069	84	154.946328	3.808073
5	557.460385	308.799895	45	534.696682	271.632162	85	137.220392	2.497431
6	557.302590	308.557318	46	532.917670	268.499790	86	120.246842	1.557377
7	557.065922	308.311548	47	531.044252	265.145667	87	104.231816	0.923226
8	556.772879	308.065737	48	529.038551	261.538554	88	89.292991	0.514367
9	556.423442	307.813601	49	526.861965	257.646379	89	75.536884	0.271092
10	556.028912	307.548941	50	524.456813	253.445500	90	62.828523	0.126299
11	555.606127	307.277931	51	521.775979	248.937934	91	51.347978	0.048543
12	555.155076	306.997421	52	518.787279	244.118739	92	41.111727	0.018910
13	554.703777	306.716645	53	515.489676	238.942086	93	32.206588	0.000000
14	554.285866	306.441698	54	511.892767	233.355625	94	24.576724	
15	553.940519	306.181688	55	508.011685	227.325261	95	18.200148	
16	553.662092	305.930296	56	503.829774	220.889445	96	12.951502	
17	553.456127	305.690476	57	499.291097	214.078087	97	8.857426	
18	553.305932	305.440335	58	494.365775	206.860798	98	5.760438	
19	553.200275	305.176628	59	489.020647	199.175122	99	3.588865	
20	553.116815	304.880576	60	483.253328	190.986505	100	2.010221	
21	553.049932	304.552057	61	477.097343	182.310100	101	0.945364	
22	552.993991	304.190935	62	470.556524	173.226856	102	0.459963	
23	552.937725	303.787642	63	463.524484	163.764738			
24	552.858582	303.326413	64	455.868183	153.951826			
25	552.733873	302.791379	65	447.480378	143.792422			
26	552.557779	302.179163	66	438.420785	133.372834			
27	552.330096	301.486279	67	428.764079	122.776616			
28	552.027942	300.709425	68	418.436728	112.099087			
29	551.656681	299.854511	69	407.293891	101.449195			
30	551.204679	298.918099	70	395.209911	90.929233			
31	550.677325	297.899779	71	382.123485	80.643122			
32	550.080000	296.786309	72	368.131876	70.703524			
33	549.406612	295.583524	73	353.303317	61.228407			
34	548.650999	294.290810	74	337.711276	52.327122			
35	547.806808	292.910483	75	321.337939	44.094118			
36	546.873422	291.438510	76	304.211932	36.580524			
37	545.844380	289.867521	77	286.350051	29.846786			
38	544.735876	288.186279	78	267.899732	23.921568			
39	543.552760	286.377276	79	249.081063	18.814807			