Standard Normal Random Variables

1. Suppose Z is a standard normal random variable. What is $P(Z \leq 1.2)$?

2. Suppose Z is a standard normal random variable. What is $P(Z \leq -2.4)$?

3. Suppose Z is a standard normal random variable. What is $P(Z \leq -0.4)$

4. Suppose Z is a standard normal random variable. What is $P(-0.4 \leq Z \leq 1.2)$?

5. Suppose Z is a standard normal random variable. What is $P(Z > 2)$?

Normal Cumulative Distribution Function (CDF)

6. The dressed weights of Excelsior Chickens are approximately normally distributed with mean 3.20 pounds and standard deviation 0.40 pound. About what proportion of the chickens have dressed weights greater than 3.60 pounds?

7. Suppose that an automobile muffler is designed so that its lifetime (in months) is approximately normally distributed with mean 26 months and standard deviation 4 months. The manufacturer has decided to use a marketing strategy in which the muffler is covered by warranty for 18 months. Approximately what proportion of the mufflers will fail before the warranty expires?

8. Suppose that the daily demand for change (meaning coins) in a particular store is approximately normally distributed with mean $800.00 and standard deviation $60.00. What is the probability that, on any particular day, the demand for change will be below $600?

Inverse Normal CDF

9. Suppose that the daily demand for change (meaning coins) in a particular store is approximately normally distributed with mean $800.00 and standard deviation $60.00. Find the amount M of change to keep on hand if one wishes, with certainty 99%, to have enough change. That is, find M so that $P(X \leq M) = 0.99$.

10. Suppose that Z is a standard normal random variable. Find the value w so that $P(|Z| \leq w) = 0.60$.

11. A machine that dispenses corn flakes into packages provides amounts that are approximately normally distributed with mean weight 20 ounces and standard deviation 0.6 ounce. Suppose that the weights and measures law under which you must operate allows you to have only 5% of your packages under the weight stated on the package. What weight should you print on the package?

Z–TABLE Percentiles of the normal distribution.
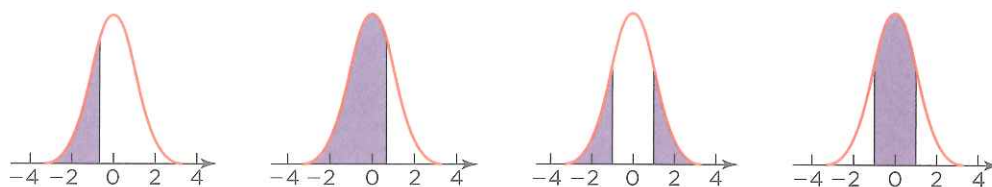
z	$P(Z \le -z)$	$P(Z \le z)$	$P(|Z| > z)$	$P(|Z| \le z)$
0	0.5	0.5	1	0
0.1	0.4602	0.5398	0.9203	0.0797
0.2	0.4207	0.5793	0.8415	0.1585
0.3	0.3821	0.6179	0.7642	0.2358
0.4	0.3446	0.6554	0.6892	0.3108
0.5	0.3085	0.6915	0.6171	0.3829
0.6	0.2743	0.7257	0.5485	0.4515
0.7	0.2420	0.7580	0.4839	0.5161
0.8	0.2119	0.7881	0.4237	0.5763
0.9	0.1841	0.8159	0.3681	0.6319
1	0.1587	0.8413	0.3173	0.6827
1.1	0.1357	0.8643	0.2713	0.7287
1.2	0.1151	0.8849	0.2301	0.7699
1.3	0.0968	0.9032	0.1936	0.8064
1.4	0.08076	0.91924	0.1615	0.8385
1.5	0.06681	0.93319	0.1336	0.8664
1.6	0.05480	0.94520	0.1096	0.8904
1.7	0.04457	0.95543	0.08913	0.91087
1.8	0.03593	0.96407	0.07186	0.92814
1.9	0.02872	0.97128	0.05743	0.94257
2	0.02275	0.97725	0.04550	0.95450
2.1	0.01786	0.98214	0.03573	0.96427
2.2	0.01390	0.98610	0.02781	0.97219
2.3	0.010720	0.989280	0.02145	0.97855
2.4	0.008198	0.991802	0.01640	0.98360
2.5	0.006210	0.993790	0.01242	0.98758
2.6	0.004661	0.995339	0.009322	0.990678
2.7	0.003467	0.996533	0.006934	0.993066
2.8	0.002555	0.997445	0.00511	0.99489
2.9	0.001866	0.998134	0.003732	0.996268
3	0.001350	0.998650	0.002700	0.997300
3.1	0.0009676	0.9990324	0.001935	0.998065
3.2	0.0006871	0.9993129	0.001374	0.998626
3.3	0.0004834	0.9995166	0.0009668	0.9990332
3.4	0.0003369	0.9996631	0.0006739	0.9993261
3.5	0.0002326	0.9997674	0.0004653	0.9995347
3.6	0.0001591	0.9998409	0.0003182	0.9996818
3.7	0.0001078	0.9998922	0.0002156	0.9997844
3.8	0.00007235	0.99992765	0.0001447	0.9998553
3.9	0.00004810	0.99995190	0.00009619	0.99990381
4	0.00003167	0.99996833	0.00006334	0.99993666
4.5	0.000003398	0.999996602	0.000006795	0.999993205
5	0.0000002867	0.9999997133	0.0000005733	0.9999994267
10	7.62×10^{-24}	1	1.52×10^{-23}	1
20	2.75×10^{-89}	1	5.51×10^{-89}	1
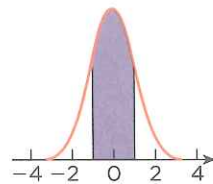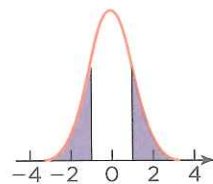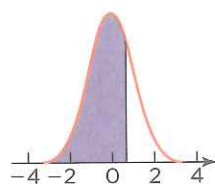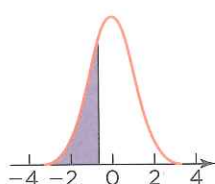
z	P(Z ≤ −z)	P(Z ≤ z)	P(|Z| > z)	P(|Z| ≤ z)
0	0.50	0.50	1	0
0.0502	0.48	0.52	0.96	0.04
0.1004	0.46	0.54	0.92	0.08
0.1510	0.44	0.56	0.88	0.12
0.2019	0.42	0.58	0.84	0.16
0.2533	0.40	0.60	0.80	0.20
0.3055	0.38	0.62	0.76	0.24
0.3585	0.36	0.64	0.72	0.28
0.4125	0.34	0.66	0.68	0.32
0.4677	0.32	0.68	0.64	0.36
0.4959	0.31	0.69	0.62	0.38
0.5244	0.30	0.70	0.60	0.40
0.5828	0.28	0.72	0.56	0.44
0.6433	0.26	0.74	0.52	0.48
0.6745	0.25	0.75	0.50	0.50
0.7063	0.24	0.76	0.48	0.52
0.7388	0.23	0.77	0.46	0.54
0.7722	0.22	0.78	0.44	0.56
0.8064	0.21	0.79	0.42	0.58
0.8416	0.20	0.80	0.40	0.60
0.8779	0.19	0.81	0.38	0.62
0.9154	0.18	0.82	0.36	0.64
0.9542	0.17	0.83	0.34	0.66
0.9945	0.16	0.84	0.32	0.68
1.0364	0.15	0.85	0.30	0.70
1.0803	0.14	0.86	0.28	0.72
1.1264	0.13	0.87	0.26	0.74
1.1750	0.12	0.88	0.24	0.76
1.2265	0.11	0.89	0.22	0.78
1.2816	0.10	0.90	0.20	0.80
1.3408	0.09	0.91	0.18	0.82
1.4051	0.08	0.92	0.16	0.84
1.4758	0.07	0.93	0.14	0.86
1.5548	0.06	0.94	0.12	0.88
1.6449	0.05	0.95	0.10	0.90
1.7507	0.04	0.96	0.08	0.92
1.8808	0.03	0.97	0.06	0.94
1.9600	0.025	0.975	0.05	0.95
2.0537	0.02	0.98	0.04	0.96
2.3263	0.01	0.99	0.02	0.98
2.5758	0.005	0.995	0.01	0.99
2.8070	0.0025	0.9975	0.005	0.995
3.0902	0.001	0.999	0.002	0.998
3.2905	0.0005	0.9995	0.001	0.999
3.7190	0.0001	0.9999	0.0002	0.9998
3.8906	0.00005	0.99995	0.0001	0.9999
4.2649	0.00001	0.99999	0.00002	0.99998
4.4172	0.000005	0.999995	0.00001	0.99999