Stat101 Worksheet
Z-Scores and Normal Table Areas

Name:

Section:

1. A value that when standardized to a z-score of -2 is two standard deviations _____ (below or above) the mean.

2. Using the 68-95-99.7 rule, what percentage of the observations are within one standard deviation of the mean? A. 68 B. 95 C. 99.7 D. None of these

3. You score 64 (y) on an exam taken by a lot of people. Generally we believe the exam scores follow a normal distribution with mean $\mu = 78$ and standard deviation $\sigma = 8$.
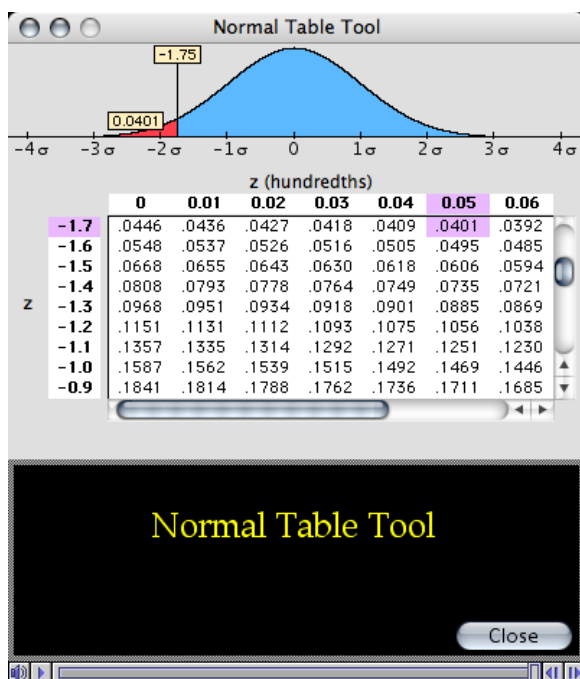
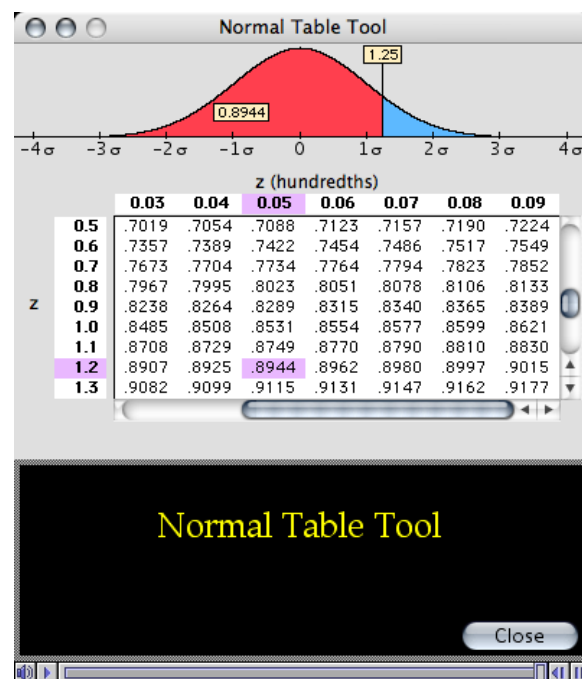   (a) Calculate your z-score:

   $$z = \frac{y - \mu}{\sigma} =$$

   (b) Your friend's z-score was 1.25. Calculate her actual score, by rearranging the standardizing equation:

   $$y = z\sigma + \mu =$$

   (c) How many standard deviations is your friend's score above the mean?

   (d) Using the display A (below left) what proportion of students scored less than a z-score of -1.75 on the exam?

   (e) Using the display B (below right) what proportion of students scored higher than your friend on the exam?


A

z (hundredths)

	0	0.01	0.02	0.03	0.04	0.05	0.06
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685

B

z (hundredths)

	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.5	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9082	.9099	.9115	.9131	.9147	.9162	.9177

Normal model: Painted turtles — Name:

Below are length measurements made on mature female painted turtles in Iowa, in mm.

93	94	96	101	102	103	104	106
107	112	113	114	116	117	117	119
120	120	121	125	127	128	131	135
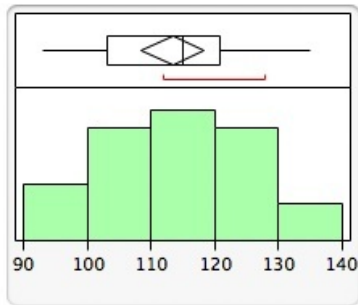
Question 1: Suppose the average length of all female painted turtles is 113 and the standard deviation is 11.5. That is $\mu = 113, \sigma = 11.5$.

Count the number of turtles in our sample that have length within one standard deviation of the mean: _____.

Count the number of turtles in our sample that have length within two standard deviation of the mean: _____.

Question 2:
What is the proportion of painted turtles with lengths within one standard deviation of the mean, in our sample? _____

Question 3: Which of the following words describe the shape of the distribution of turtle length based on the histogram above?

Skewed right   Skewed left   Symmetric   Unimodal   Bimodal   Multimodal

Question 4:
Is it believable that the length of turtles follows a normal model, based on ths sample?
Yes   No

Question 5: Assuming that turtle length follows a normal model what proportion of all mature female painted turtles will be smaller than 95mm?

Question 6: What length corresponds to the 90'th percentile? (Hint: The value that has 90% of turtles smaller than it.)