MAT 223, Discussion Questions 9.16

1. When someone says they are above the 90th percentile, what does that mean?

   at least 90% of the distribution has a lower measurement; you are in the top 10% of The distribution

2. If you have an ordered list of 38 terms, and you want to determine which element in the list is the 85th percentile, how do you do it? Which element is it?

   $.85 * 38 = 32.3$ 32nd element

3. What percentile is the 14th element in the list?

   $\frac{14}{38} = .368$ roughly 37th percentile

4. What percentile is the median value? What is the percentile for the first quartile? Third quartile?

   50th   25th , 75th

5. Consider the data set

14	36	40	43	44	49	51	51	55	55
55	56	61	61	63	67	70	75	78	82

   a. What is the median?

   Med = 55

   20 items
   average 10th & 11th items
   $\frac{55+55}{2} = 55$

   b. What is Q1? What is Q3?

   $Q_1 = 46.5$ $\frac{44+49}{2} = 46.5$
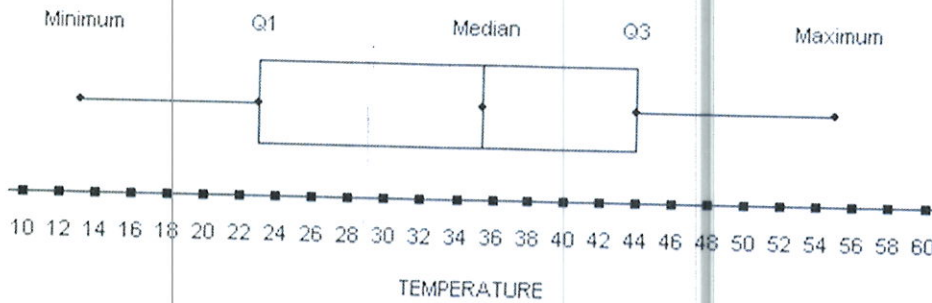
   $Q_3 = 65$ $\frac{63+67}{2} = 65$

   c. What is the interquartile range (IQR)?

   $65 - 46.5 = 18.5$

6. How can you tell from a boxplot If the distribution is skewed or symmetric?

Compare length of bars & whether median is centered or not

7. What temperature represents approximately the 38th percentile based on the box plot shown?
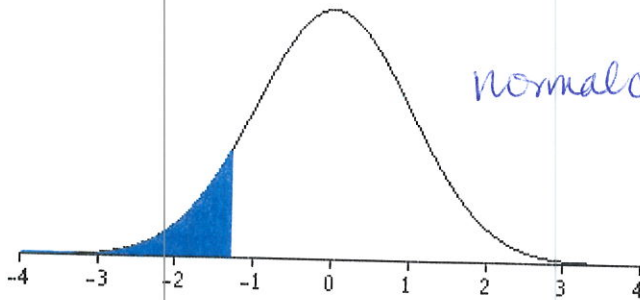

TEMPERATURE

38th percentile
$\approx \frac{3}{8}$
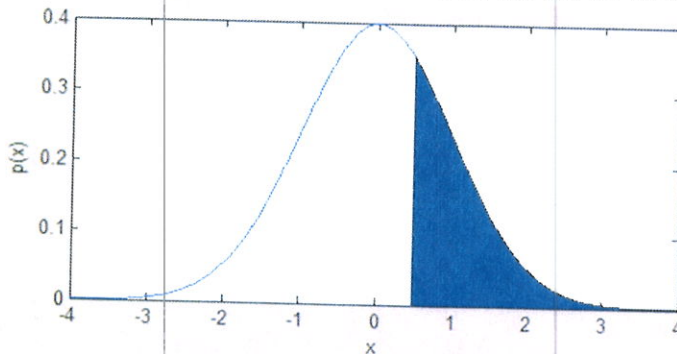*between $\frac{1}{4}$ & $\frac{1}{2}$*

$29°$

8. Find the shaded area for the shaded region using the table of z-values from the textbook.
   a. Find the shaded area under the curve if the mean is 0 and the standard deviation is 1. The cut-off score here is $z = -1.28$.
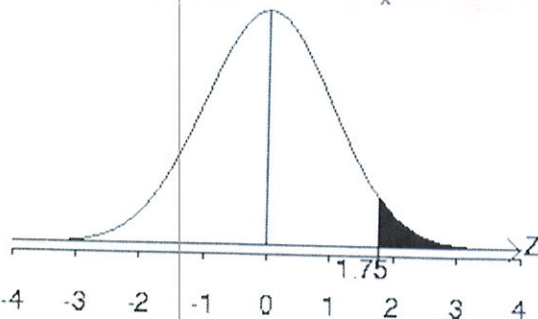

normalcdf$(-E99, -1.28) =$
.10027...
10%

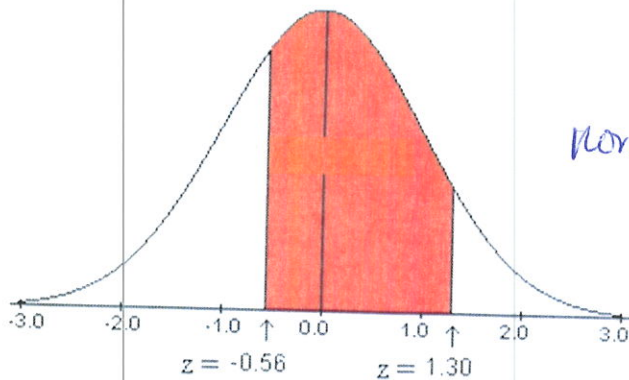   b. Find the shaded area under the curve for the cut-off value $z = 0.5$.

normalcdf$(.5, E99)$
$= .3085...$
30.9%

   c.   -4 -3 -2 -1 0 1 2 3 4

normalcdf$(1.75, E99) =$
.040059...
4%

normalcdf(-.56, 1.30) =

.615459...,

61.5%

d.

9. What is the standard score of someone whose IQ is 135 if the mean of the distribution is 100 and the standard deviation is 15?

$$Z = \frac{135-100}{15} = \frac{35}{15} = 2.3\overline{3}$$

10. If a student takes the ACT, which has a mean of 21 and a standard deviation of 5.2, and obtains a score of 25, do they have a higher or lower score than another student who took the SAT, which has a mean of 1498 and a standard deviation of 199, obtained a score of 1780.

$$Z = \frac{25-21}{5.2} = \frac{4}{5.2} = .7692...$$

$$Z = \frac{1780-1498}{199} = \frac{282}{199} = 1.417...$$

the 1780 score is higher

11. Who is smarter? Someone with an IQ of 148 with a mean of 100 and a standard deviation of 15, or someone with an IQ of 167 with a mean of 110 and a standard deviation of 20?

$$Z = \frac{148-100}{15} = \frac{48}{15} = 3.2 \qquad \text{the 148 score is higher}$$

$$Z = \frac{167-110}{20} = \frac{57}{20} = 2.85$$

12. The article at http://ww2.kqed.org/mindshift/2015/07/21/how-teaching-with-symmetry-improves-math-understanding/ talks about using symmetry to improve math understanding. How is symmetry employed in teaching the topics in this chapter?