9.07b Quiz Review: Centers, Spread, & Normal Distribution
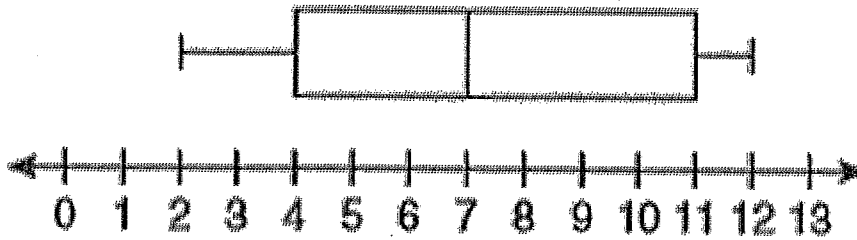
Use the following box and whisker plot to identify the information requested in #1 – 5.

[Box and whisker plot over a number line marked 0 1 2 3 4 5 6 7 8 9 10 11 12 13]

1. What percent of values fall between 4 and 11? between Q1 and Q3 is the middle 50% **50°**	**5. Identify the test scores for each value:** Q1: **4**
2. What percent of values are below 7? **50°**	(median) Q2: **7**
	Q3: **11**
3. What percent of values are above 11? **25°**	Minimum: **2**
	Maximum: **12**
4. Describe the shape of the distribution of test scores. Skewed left *longer tail on the left*	(Q3 – Q1 (11 – 4 = 7) IQR: **7** 12 – 2 = 10 → Range: **10**

Notes:

In a normally distributed distribution, the mean is the best measure of central tendency.

With skewed distributions (left or right), however, median can be the better measure of central tendency

The interquartile range (IQR) is the range of values within which reside the middle 50% of the scores.

The first quartile (Q1) indicates that 25% of the scores have a value lower than Q1

The third quartile (Q3) indicates that 75% of the scores have a value lower than Q3

The median is the value that is in the "middle" of the distribution (Q2), with 50% of the scores having a value less than the median

6) A machine is used to put bolts into boxes. It does so such that the actual number of bolts in a box is normally distributed with a mean of 106 and a standard deviation of 2.

a) Label the x-axis and the Empirical rule probabilities under the Normal distribution graph below.

$\bar{x} = 106$

$\sigma = 2$

0.15   2.35   13.5   34   34   13.5   2.35   0.15

100   102   104   106   108   110   112
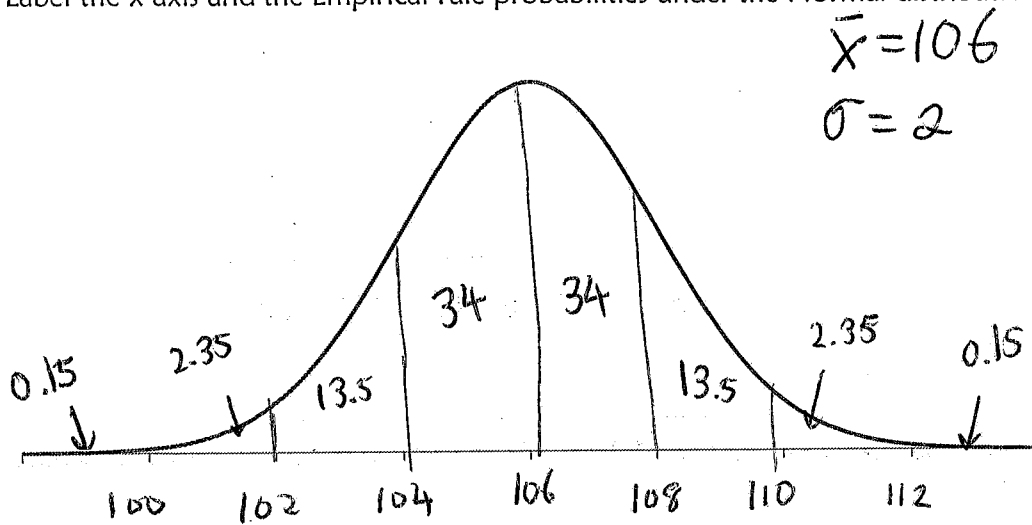
Use the scenario and graph above to answer the following questions. Show all work and write a probability statement for each. Answers may be given in percent or decimal form.

a) What percentage of boxes contain no more than 108 bolts?   **84%**

$P(x \le 108) =$

b) What percentage of boxes contain at least 104 bolts?   **84%**

$P(x \ge 104)$

c) What is the probability of boxes containing between 102 and 112 bolts?   **97.35%**

$13.5 + 34 + 34 + 13.5 + 2.35$

d) What number represents the 78ᵗʰ percentile?   _____

$0.78 \rightarrow z = 0.77$

$z = \dfrac{x - \bar{x}}{\sigma} \rightarrow 0.77 = \dfrac{x - 106}{2}$

$1.54 = x - 106$

$\boxed{x = 107.54}$

7) A test was given to 120 students, and the scores approximated a normal distribution. If the mean score was 72 with a standard deviation of 7, approximately what percent of the scores were 65 or higher?

$\bar{x} = 72$

$\sigma = 7$

$x = 65$

$z = \dfrac{65 - 72}{7}$

$z = -1$

0.1587

$P(x \ge 65) = 1 - 0.1587 = \boxed{0.8413}$

$\boxed{84.13\%}$