STAT 1350, 2/24 Discussion Questions

The heights (inches) of students in a graduate-level statistics are displayed below:

Student	Bob	Sue	Pam	Lee	Mary	Carl	Ace	Moe	Ann
Height	68	69	63	73	67	66	69	70	71

1. What is the median height (inches) of these students? Find it by hand and then verify it in your calculator.

   69

2. What is the third quartile of these heights (inches)? Find it by hand and then verify it in your calculator.

   70.5

3. What is the mean of these heights (inches)? Find it by hand and then verify it in your calculator.

   68.4̄

4. What is the standard deviation of these heights (inches)? Find it by hand and then verify it in your calculator.

   2.92   (Sx in calc)

5. What is the main advantage of boxplots (or box-and-whisper plots) over stem plots (or stem-and-leaf plots) and histograms?

   easy to graph with only a couple values while still giving info about spread & skew

6. The calorie counts for the 17 poultry brands are:

   129 132 102 106 94 102 87 99 170 113 135 142 86 143 152 146 144

   What is the first quartile of the 17 poultry hot dog calorie counts?

   100.5

Here are the number of hours that each of a group of students studied for an exam:

2 4 22 2 1 4 1 5 5 4

7. What is the median number of study hours?

   4

8. What is the mean number of study hours?

   5

9. What is the third quartile of the number of study hours?

5

10. What is the standard deviation of the number of study hours?

≈ 6.16

11. The data contains one high outlier (22 hours). Which of your results for the previous four questions would change if this were 5 hours instead of 22 hours? (You do *not* need to calculate new values.)

mean and standard deviation

12. For a distribution that is skewed to the left, usually the

mean is less than the median

13. The five numbers in the five-number summary are

min, Q_1, median, Q_3, max

The following is a stemplot of 12 exam scores.
(The stem is the tens place and the leaf is the ones place.):

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6  8
7  66
8  0488
9  22666
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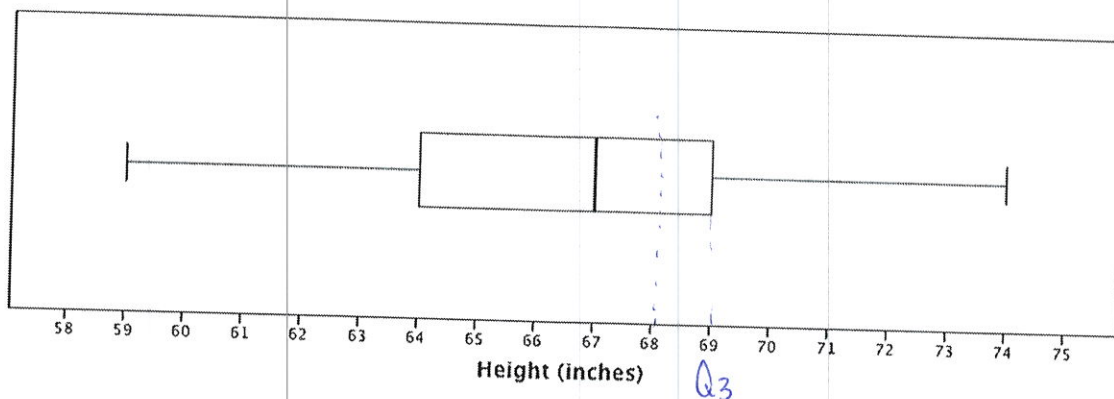14. What is the median? [Hint: What is the list of raw data based on the chart?]

88

15. What is the mean?

86

16. The standard deviation is a measure of what property of a distribution?

Spread or variability

This boxplot shows the distribution of heights of 16 undergraduate statistics students.


Height (inches)   Q3

17. From the above boxplot, approximately how many students are 69 inches or taller? [Hint: What is the 5 number summary, and which of those numbers is 69 inches? What does that number mean?]

$$25\% = .25*16 = \boxed{4}$$

18. From the above boxplot, what height would a student have to be in order to be taller than 60% of other students? [Hint: Estimate this: 62.5% is halfway between which two numbers of the 5-number summary?]

68 inches

19. A set of measurements has this boxplot:

A   B   C   D   E
min   Q1 med   Q3   max
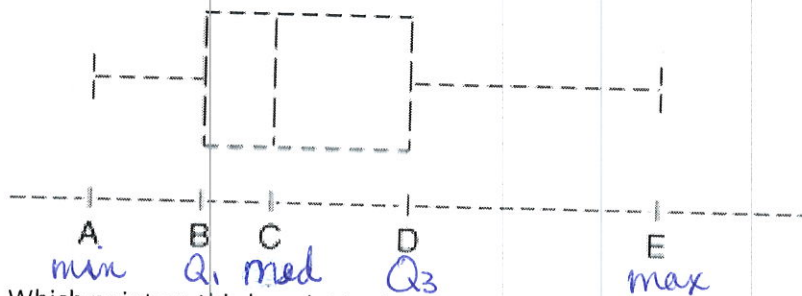
Which point on this boxplot is the median of the distribution? Label all key features of this graph. Does the data appear to be symmetric, skewed left or skewed right?

Skewed right

20. What are two important properties of the standard deviation?

$$s \geq 0 \qquad (s=0 \text{ means no spread})$$

measures spread around the mean

STAT 1350, 2/26 Discussion Questions

1. What is another name for the normal distribution?

   bell curve; also called Gaussian distribution

2. Describe some important features about normal distributions.

   symmetric around the mean
   defined by 2 parameters: mean and standard deviation

3. Give at least three examples of random variables that are distributed normally.

   measurement errors
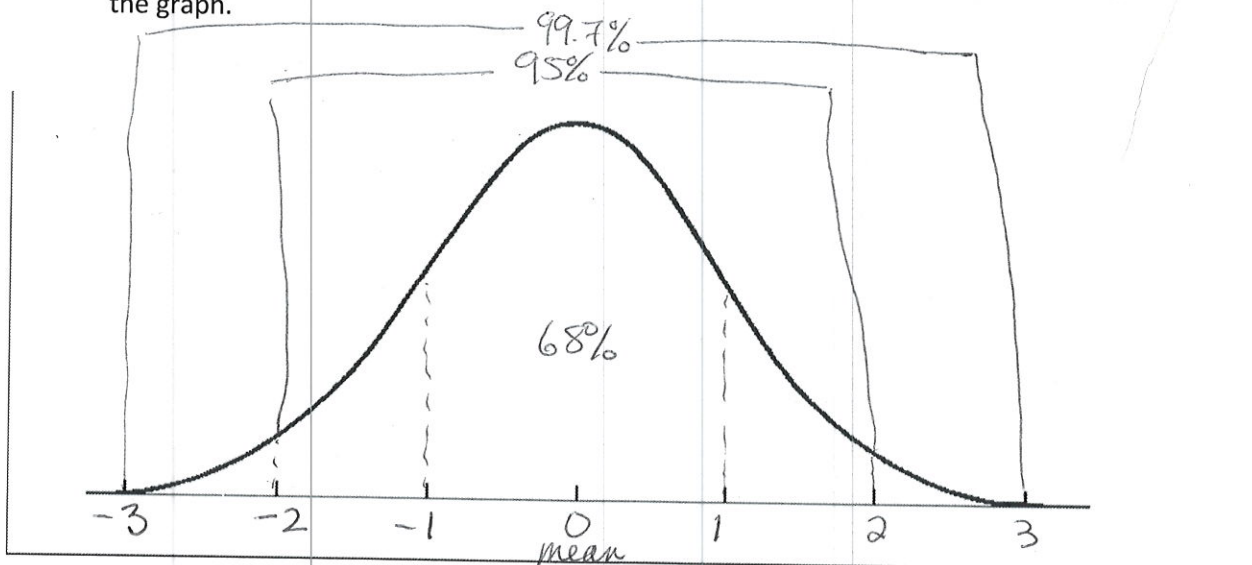   heights   answers will vary
   IQs

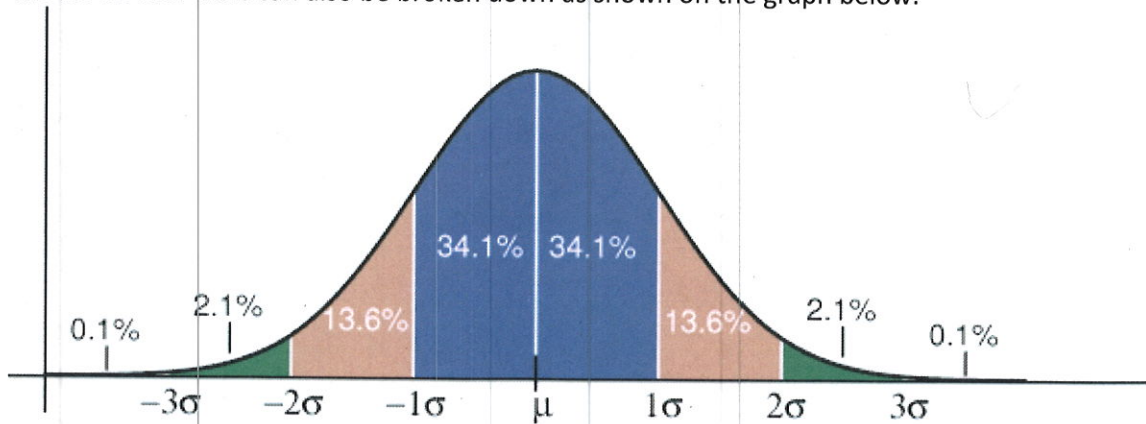4. What is the standard deviation of the standard normal distribution?

   1

5. What is the 68-95-99.7% rule? [This rule is also known as the Empirical Rule.]

   between -1 & 1 on the standard normal curve is 68%,
   between -2 & 2 is 95% and between -3 & 3 is 99.7%

6. Fill in the picture of the standard normal distribution below and label at least 6 key features on the graph.

7. The 68-95-99.7 Rule can also be broken down as shown on the graph below.

0.1%   2.1%   13.6%   34.1%   34.1%   13.6%   2.1%   0.1%

-3σ -2σ -1σ μ 1σ 2σ 3σ

If the mean of a distribution is 100, and the standard deviation is 15, what percent of the population is between 70 and 115? Draw the normal distribution below and use the data from the graph above to calculate the percentage. Label all key features.

$68.2 + 13.6 =$
81.8%

68%
(or 68.2%)

13.6%

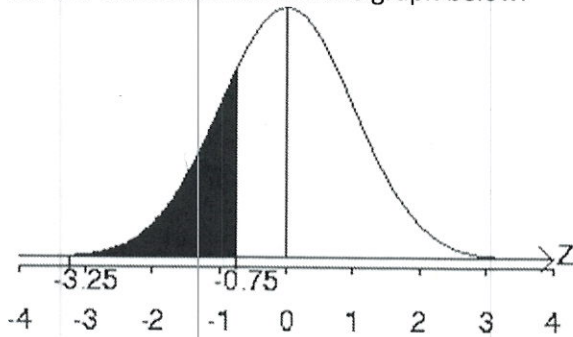55   70   85   100   115   130   145
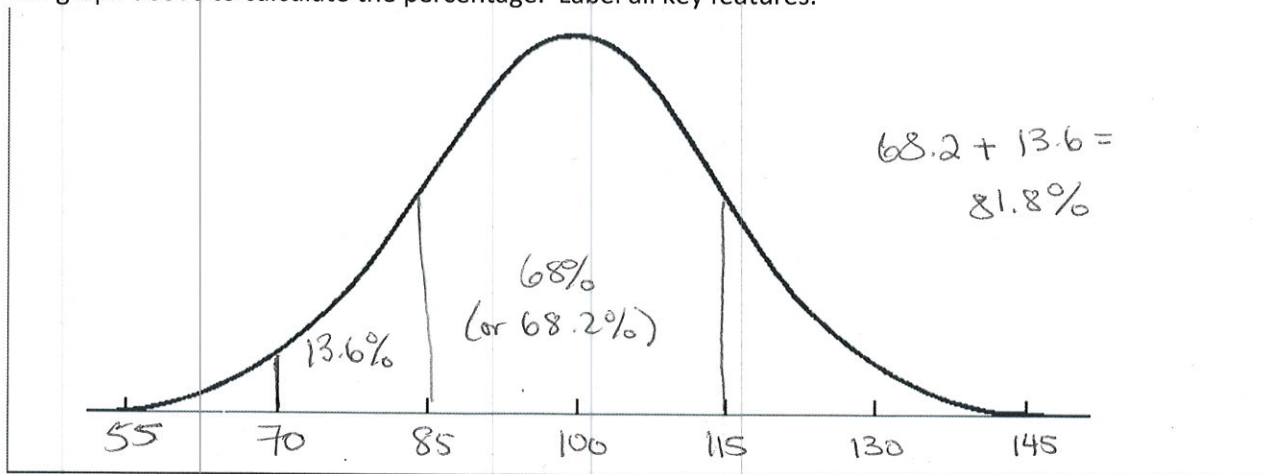
8. Based on the graph below, what is the mean height of men? What is the mean height of women? Which group has a larger standard deviation?
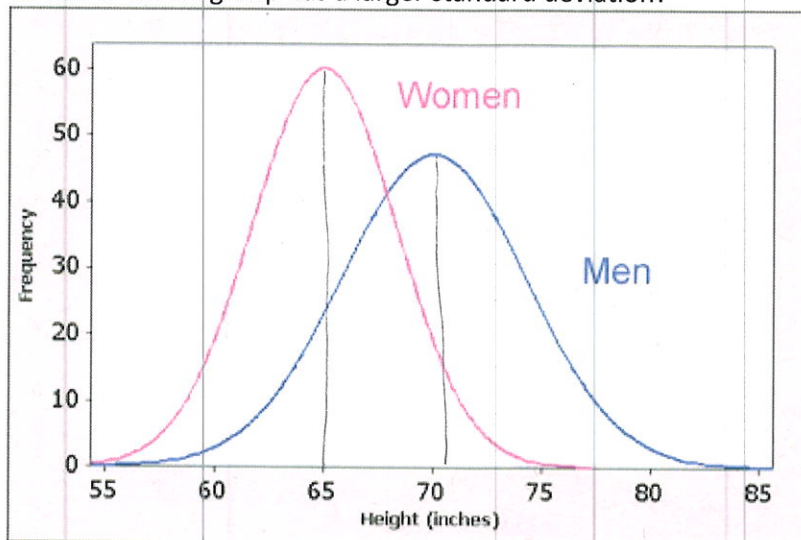
around 70"
around 65"
men have larger
standard deviation

9. Use the table in your book to estimate the probability (area) under the normal distribution curve for the z-scores shown on the graph below.

$22.695 - .06 =$

22.635%

area below -3.25 is $0.06 = \frac{.05 + .07}{2}$

area below $-.75$ is $\frac{24.20 + 21.19}{2} = 22.695$

10. Suppose that the mean IQ of a certain high school is 109, with a standard deviation of 13. What is the standard score (z-score) of a student with an IQ score of 125?

$$z = \frac{125 - 109}{13} = 1.23$$

11. What is the probability that a student in the school (in #10) will have an IQ below 125?

Using calculator

normalcdf $(-E99, 125, 109, 13) =$
or normalcdf $(-E99, \text{answer in } \#10) = .890795$ 89%

12. What is the probability that a student in the school (in #10) will have an IQ above 125?

$1 - .890795 = .10920 = 10.9\%$

13. What is the percentile ranking represented by an IQ of 125?

89th percentile