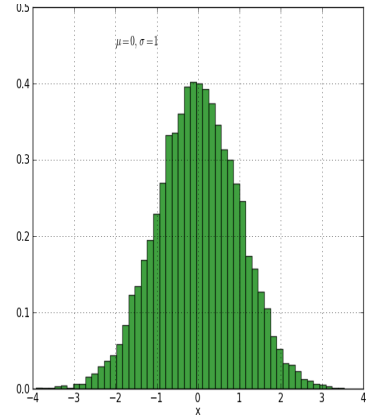
SM3 HW KEY 14.2 Normal Distributions

14.2 EXERCISES **NAME**_____ **PER.**_____

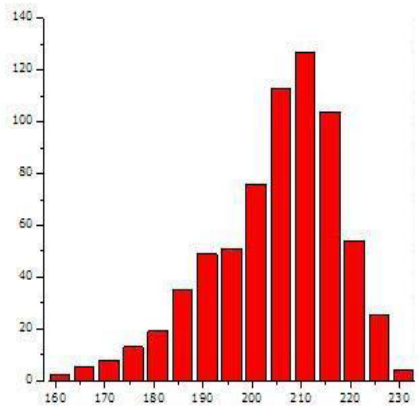
For 1-9 indicate whether you think the distribution could be normal. If not, indicate which characteristic is not met.

1.



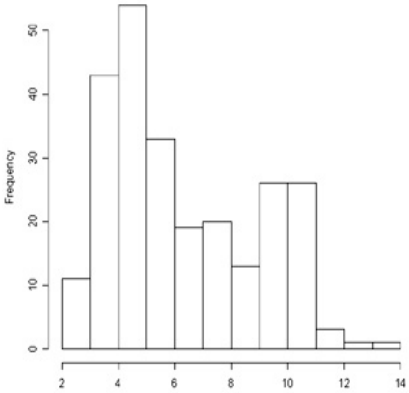
Normal | Not Normal
Why is it not normal?

2.



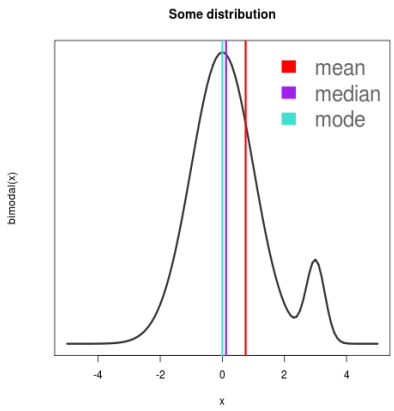
Normal | **Not Normal**
Why is it not normal? **Not symmetric**

3.



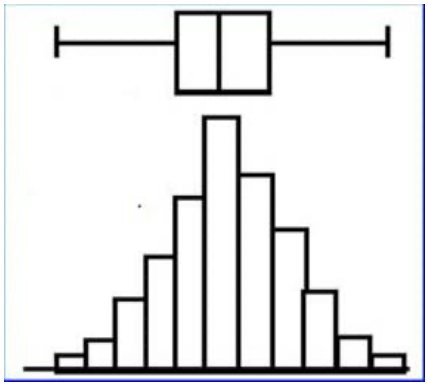
Normal | **Not Normal**
Why not normal? **Not symmetric**

4.



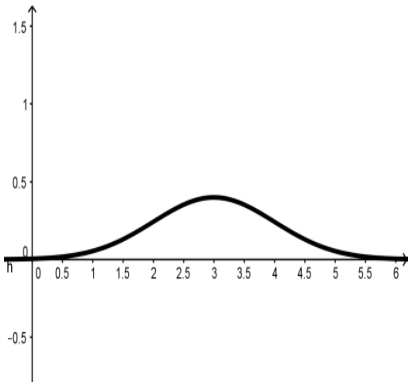
Normal | **Not Normal**
Why not normal? **Not unimodal**

5.



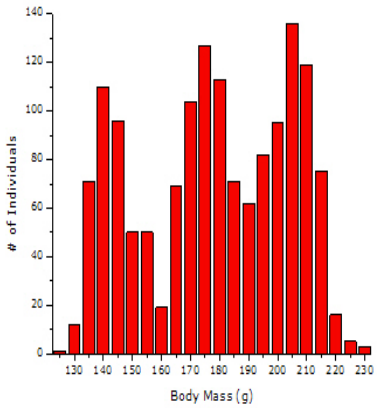
Normal | Not Normal
Why is it not normal?

6.



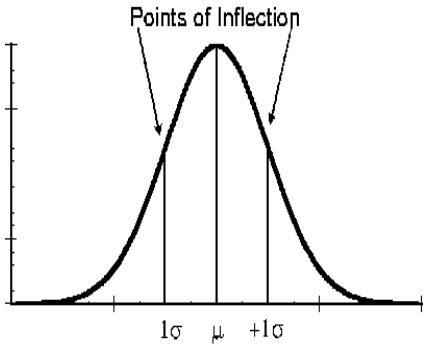
Normal | Not Normal
Why is it not normal?

7.



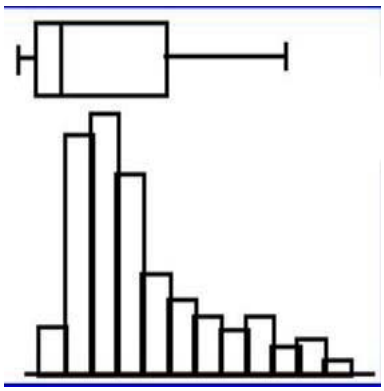
Normal | **Not Normal**
Why is it not normal? **Not unimodal**

8.



Normal | Not Normal
Why is it not normal?

9.



Normal | **Not Normal**
Why not normal? **Not symmetric**

10. Use the 68%-95%-99.7% Rule (Empirical Rule) to see if the following data set could be approximately Normal:

5.5	5.6	4.9	5.1	5.3	5.6	5.4	5.3	5.6	5.7
5.6	5.5	5.6	5.3	5.4	5.3	5.8	5.1	5.3	5.4
5.4	5.5	5.6	5.3	5.5	5.3	5.8	5.7	5.9	5.2

Using the calculator you find that the mean=5.45 and the standard deviation=0.23

a. What is the interval of values that are 1 σ away from the mean? **(5.22, 5.68)**

2σ from the mean? **(4.99, 5.91)**

3σ from the mean? **(4.76, 6.14)**

b. What % of the values lies within one standard deviation of the mean? $\frac{21}{30}$ **=70%**

c. What % of the values lies within two standard deviations of the mean? $\frac{29}{30}$ **=96.7%**

d. What % of the values lies within three standard deviations of the mean? $\frac{30}{30}$ **=100%**

e. Does the data fit the Empirical Rule? **Not exactly but it is very close**

f. Would you say that the data set is Approximately Normal or not Normal? **Approximately normal**

Find the following solutions using the 68%-95%-99.7% Rule or a calculator.
IF A CALCULATOR IS NOT AVAILABLE, THIS WEBSITE HAS A CALCULATOR TO FIND NORMAL PROBABILITIES:
http://www.mathportal.org/calculators/statistics-calculator/normal-distribution-calculator.php

11. The mathematics portion of the SAT has a mean score of 500 and a standard deviation of 100.
   a. What is the interval that contains the middle 99.7% of scores? **(200, 800)**
   b. What percentage of SAT scores is greater than 600? **16%**
   c. What percentage of SAT scores is between 300 and 700? **95%**

12. Americans consume 16.5 pounds of ice cream per year with a standard deviation of 3.25 pounds.
   a. What is the interval that contains 68% of the pounds consumed each year? **(13.25, 19.75)**
   b. What percentage of pounds consumed is less than 10 pounds? **2.3%**
   c. What percentage of pounds consumed is between 5 pounds and 11pounds? **4.51%**

13. The average height of a NBA basketball player is 79 inches with a standard deviation of 3.89 inches.
   a. What is the interval that contains 95% of the heights? **(71.22, 86.78)**
   b. What percentage of the heights is greater than 81 inches? **30.4%**
   c. What percentage of the heights is between 73 inches and 77 inches? **24.2%**

14. This year's ACT Scores had a mean $\mu = 19$ and a standard deviation $\sigma = 5.4$ Joey knows that Yale University usually only accepts students that performed in the top 1% on the ACT test. Joey has great grades and got a 34 on his ACT test, will Joey qualify for acceptance to Yale University this year?
Normalcdf(34,1E99,19,5.4)=.0027 Joey is in the 99.73 percentile and is within the top 1%... Joey gets into Yale.

15. A bag of Lay's Potato Chips have weights that are normally distributed with a mean of 9.12 ounces and a standard deviation of 0.05 ounces. If the print the weight on the front of the bag as being 9 ounces, what percentage of the bags of chips would actually be under weight? **Normalcdf(-1E99, 9, 9.12, 0.05) = 0.8%**
Why don't they print the weight as 9.12 ounces? **If they printed the mean on the bag, there would be half of the bags that were "underweight" and people would complain that they were cheated. By printing a weight lower than the actual expected amount then only a small amount are "underweight" and consumers don't get angry**