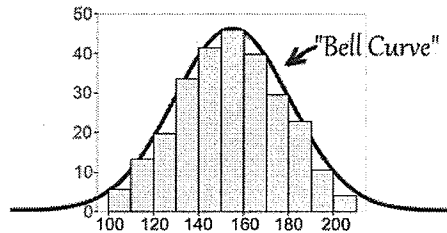


## Normal Distributions

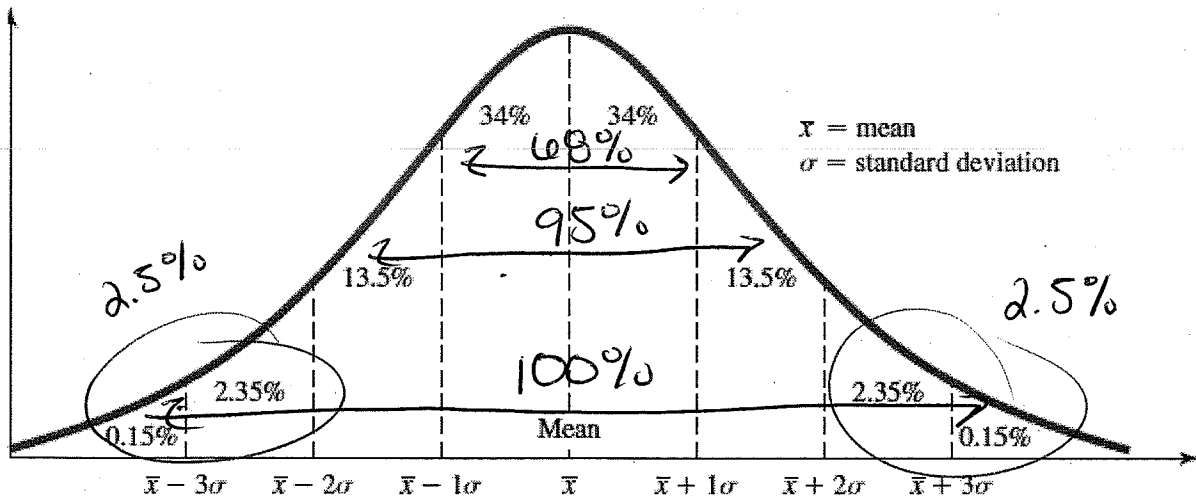
As we saw yesterday the **distribution** of a set of data refers to the pattern with which the observations are arranged.

Data can be "distributed" (spread out) in different ways. But there are many cases where the data tends to be around a central value with no bias left or right, and it gets close to a "Normal Distribution" like this:



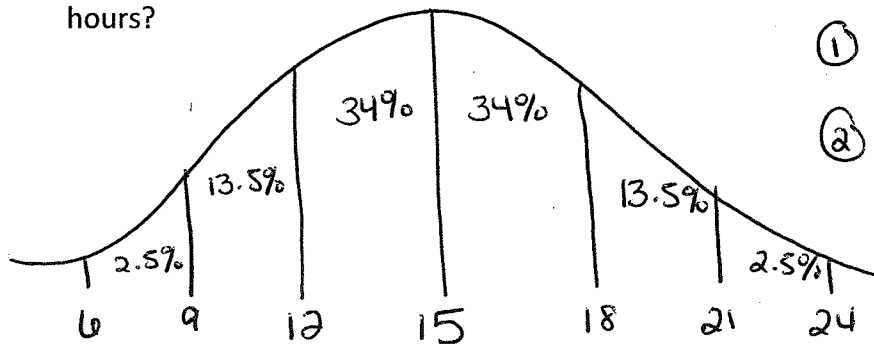
Data following a normal distribution will have the following characteristics:

- 1.) The mean, median, and mode are the same.
- 2.) The curve is symmetrical with a single central peak at the mean of the data.
- 3.) The normal curve is bell-shaped with the graph falling off evenly on either side of the mean. The place where the bell shape changes from curving downward to curving back up (point of inflection) is exactly one standard deviation from the mean.
- 4.) The total area under the curve is 1.
- 5.) 68% of the data will be within  $\pm 1$  standard deviation of the mean  
 95% will be within  $\pm 2$  standard deviations  
 and 99.7% of the data are within  $\pm 3$  standard deviations. (Empirical Rule)



Sketch and label a normal curve for each situation below. Then answer the question.

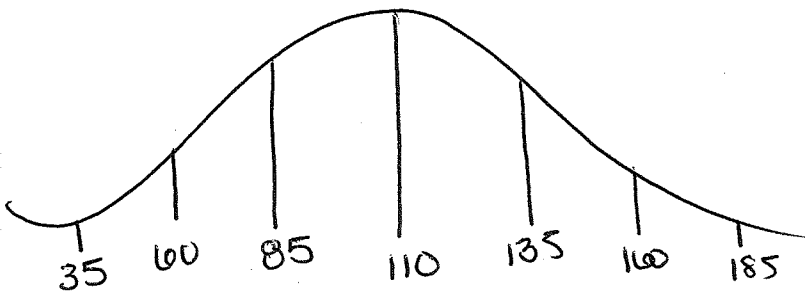
ex.) The amount of time that Paul plays Call of Duty in any given week is normally distributed. If Paul plays an average of 15 hours per week, with a standard deviation of 3 hours, what is the probability of Paul playing between 15 and 18 hours a week? What is the probability of Paul playing less than 12 hours?



① between 15-18 = 34%

② less than 12 = 10%

ex.) Scores on the Wechsler Adult Intelligence Scale (WAIS, a standard "IQ test") for the 20 to 34 age groups are approximately normally distributed with  $\mu = 110$  and  $\sigma = 25$ .



a.) About what percent of people in this age group have scores above 110?

50%

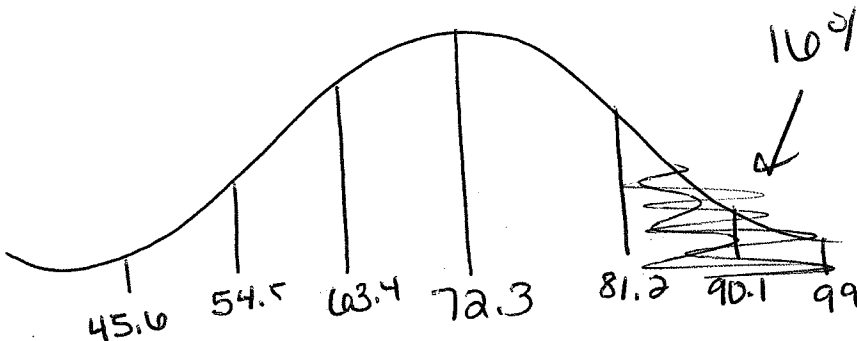
b.) About what percent have scores above 160?

2.5%

c.) In what range do the middle 95% of all IQ scores lie?

60 - 160

ex.) Professor Snape has 184 students in his Potions class. The scores on the midterm exam were normally distributed with a mean of 72.3 and a standard deviation of 8.9. How many students in the class received a score above 81.2?



$184 (.10) = 29.44$

$\approx$  30  
Students