Statistics Review

Problem 1

You are given the data set {13, 10, 2, 2, 4, 12, 8, 6, 5, 9, 11, 14, 11, 8, 5, 8}.

1. Find the mean, median, and mode.
2. Add two different data values to the set that will not affect the mean, median, or mode.
3. Construct a histogram of the data, including the data values you added.
4. Using a calculator, find the standard deviation of the data set, including the new values.
5. Which values are within 1 standard deviation of the mean? Are any data values more than 2 standard deviations from the mean?
6. Add two more data values, one above and one below the mean, which will increase the standard deviation. Calculate the new standard deviation.
7. The number of crackers in a box of Crackerbox Crackers is normally distributed with a mean of 75 and a standard deviation of 2. Shade the region under the curve that represents the probability that a box has between 73 and 77 crackers. What is that probability?
8. The length of time it takes to groom a dog at Shaggy's Pet Shoppe is normally distributed with a mean of 45 minutes and a standard deviation of 10 minutes. Shade the region under the curve that represents the percent of dog grooming times between 55 and 65 minutes. What is that percent?

Problem 2

Complete the following problems:

1. The College of Knowledge gives an admission qualifying exam. The results are normally distributed with a mean of 500 and a standard deviation of 100. The admissions department would like to accept only students who score in the 65^{th} percentile or better. Complete the chart below, and then determine which students would qualify and what score is associated with the 65^{th} percentile. Which students qualify for admission?

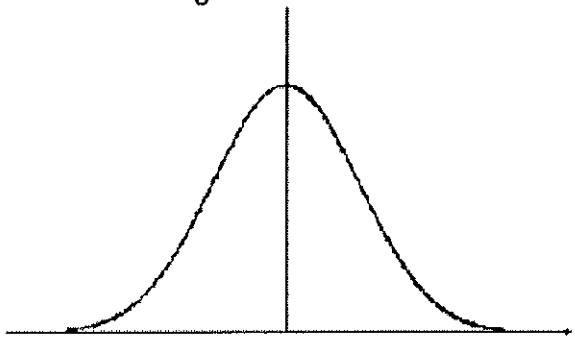
Student score	z-score	Percentile
530		
570		
650		
800		
540		

2. The MP3 player, aPod, made by Mango Corp., has an average battery of 400 hours. Battery life for the aPod is normally distributed with a standard deviation of 25 hours. The MP3 player, PeaPod, made by Pineapple Inc., has an average battery life of 390 hours. The distribution for its battery life is also normally distributed with a standard deviation of 30 hours.
   - Find the z- scores for each battery with lives of 250, 350, 410, and 450 hours.
   - Which battery lasting 410 hours performed better?
   - What percent of aPod batteries last between 375 and 410 hours?
   - What percent of PeaPod batteries last more than 370 hours?

3. The braking distance for a Krazy-Car traveling at 50 mph is normally distributed with a mean of 50 ft. and a standard deviation of 5 ft. Answer the following without using a calculator or a table.
   - What is the likelihood a Krazy-Car will take more than 65 ft. to stop?
   - What is the probability a Krazy-Car will stop between 45 ft. and 55 ft.?
   - What percent of the time will a Krazy-Car traveling at 50 mph stop between 35 and 55 ft.?
   - What is the probability a Krazy-Car will require less than 50 ft. or more than 60 ft. to stop?

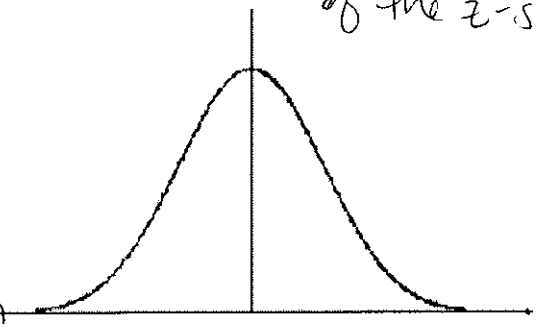
Problem 3

A corn chip factory packs chips in bags with normally distributed weights with a mean of 12.4 oz. and a standard deviation of 0.15 oz.



1. On the graph at right, label the mean and three standard deviations above and below the mean.
2. Shade the region that indicates the percentage of bags that contain less than 12.64 oz.
3. Determine the z-score corresponding to 12.64, using the formula z-score = $\frac{x-\mu}{\sigma}$.

4. Use the ~~Standard Normal Probabilities Table~~ to find the area associated with the z-score obtained in 3, and interpret your result. (what is the area to the left & right of the z-score?)



5. On the graph at right, label and shade the region that represents the likelihood a bag will contain between 12.1 and 12.76 oz.
6. Calculate the z-scores corresponding to both 12.1 and 12.76, and find the Standard Normal Probabilities ~~for each, using a calculator or the Standard Normal Probabilities Table~~. (Find the probability between the two values)
7. Explain how you would use those values to determine the probability a bag chosen at random will contain between 12.1 and 12.76 oz.

Statistics Review

Problem 1 {13, 10, 2, 2, 4, 12, 8, 6, 7, 9, 1, 14, 11, 8, 8, 8}.

① $\bar{X} = 8$
Med = 8
mode = 8

{2, 2, 4, 5, 5, 6, 8, 8, 8, 9, 10, 11, 11, 12, 13, 14}
(8, 8, 8 circled — mode)

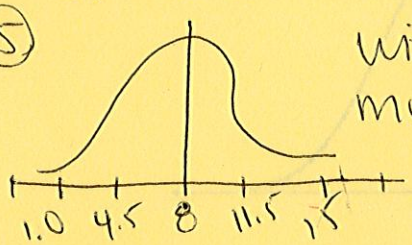
② Added 8 → $\bar{X} = 8$, med = 8, mode = 8
Added 9 → $\bar{X} = 8.05$ med = 8, mode = 8

③

*Now include both values

④ $SX = 3.5$

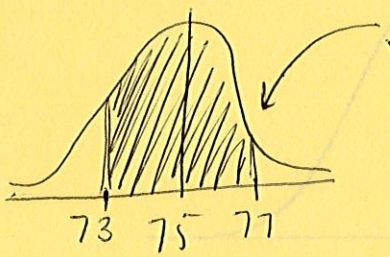
⑤



within 1SX = {5, 5, 6, 8, 8, 8, 8, 9, 9, 10, 11}
more than 2SX = ~~8~~ none !!

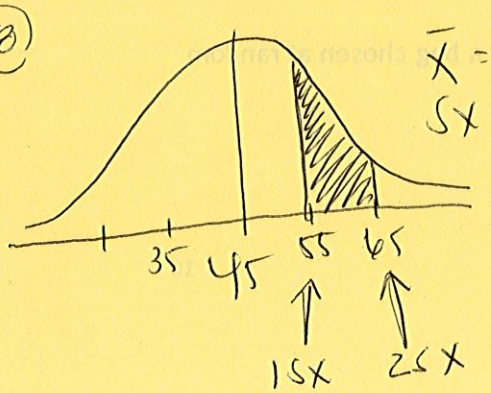
⑥ Added 15 → SX = 3.78 (increased)
Added 1 → SX = 3.79 (increased)
> Both increased because the further away the numbers, the larger the spread.

⑦ $\bar{X} = 75$ & $SX = 2$



within 1SX
so 68% is the probability

⑧



$\bar{X} = 45$
$SX = 10$

method 1: (Empirical Rule)
$\frac{95 + 68}{2} = 13.5\%$

method 2:
normalcdf(55, 65, 45, 10)
≈ 13.5%

Problem 2 $\bar{X} = 500$ $SX = 100$

① Student score	Z-score	percentile ← normalcdf (percentile = left shading)
530	$530-500/100 = .3$	62%
570	$570-500/100 = .7$	76%
650	$650-500/100 = 1.5$	93%
800	$800-500/100 = 3$	99%
540	$540-500/100 = .4$	66%

② aPod $\bar{X} = 400$, $SX = 25$

Peapod $\bar{X} = 390$, $SX = 30$

- 250 | 350 | 410 | 450

aPod $\frac{250-400}{25} = -6$ $\frac{350-400}{25} = -2$ $\frac{410-400}{25} = .4$ $\frac{450-400}{25} = 2$

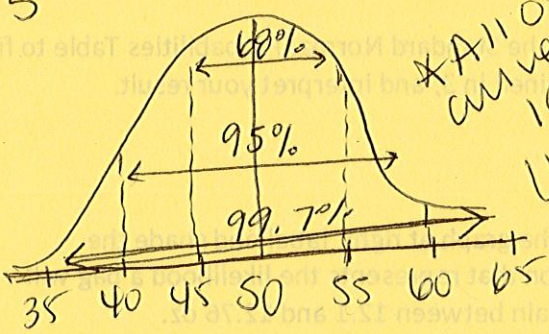
peapod $\frac{250-390}{30} = -4.7$ $\frac{350-390}{30} = -1.3$ $\frac{410-390}{30} = .67$ $\frac{450-390}{30} = 2$

- aPod because smaller SX
- aPod → normalcdf(375, 410, 400, 25) = ~50%
- PeaPod → normalcdf(370, E99, 390, 30) = ~75%

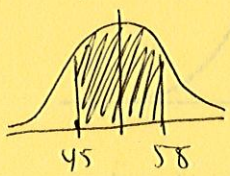
③ KRAZY-CAR $\bar{X} = 50$, $SX = 5$

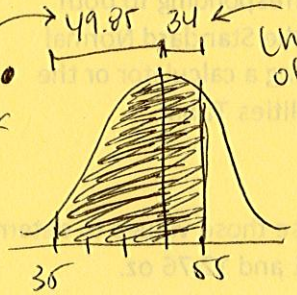
- more than 65

50 − 49.85 = .15%



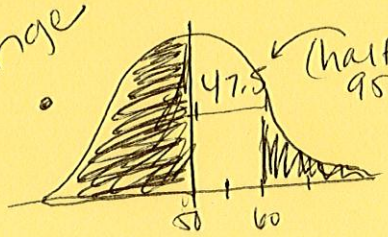
*All of curve is 100%. Half is 50%.

- 



49.85 + 34 = 83.85%

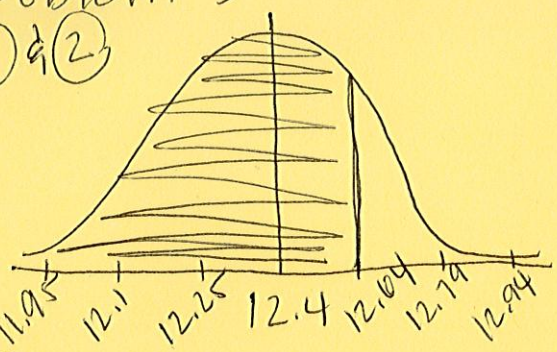
Challenge

- 

47.5%

Problem 3

①&②



③ $z = \frac{12.64 - 12.4}{.15}$

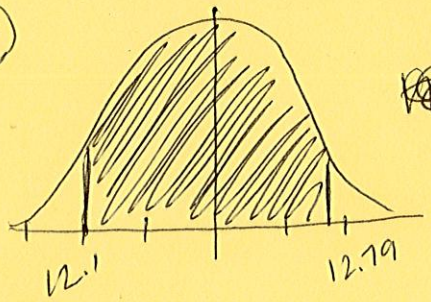
$= 1.6$

since we are using the z-scores

④ Shading to left → normalcdf(-E99, 1.6, 0, 1) = 95%

Shading to right → normalcdf(1.6, E99, 0, 1) = 5%

⑤



since using z-scores

⑥ $z = \frac{12.1 - 12.4}{.15} = -2$

$z = \frac{12.76 - 12.4}{.15} = 2.4$

normalcdf(-2, 2.4, 0, 1)

≈ 97%

⑦ You can say that there is a 97% chance that you will draw a chip between the weights of 12.1 and 12.76 oz.