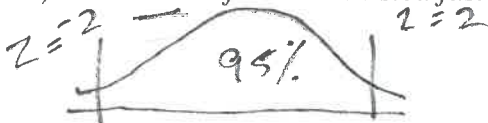


Example 5 According to our survey data, the histogram for the fastest speed ever driven is close to the normal curve with an average of about 90 mph and a SD of about 24 mph.

a) About 95% of the class listed fastest speeds between 42 mph and 138 mph.



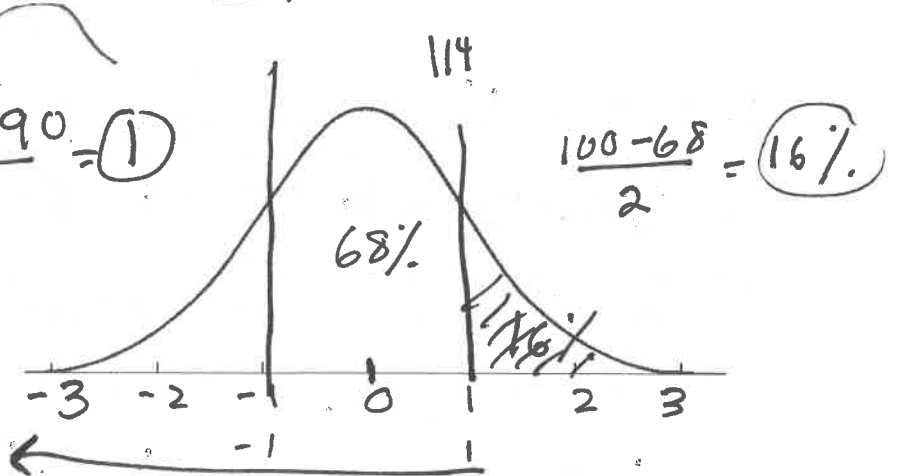
$$90 - 2(24) \quad 90 + 2(24)$$

b) One student listed her fastest speed as 114 mph.

i) About what percentage of the class listed faster speeds than her?

value $\rightarrow Z \rightarrow$

$$Z = \frac{\text{val} - \text{avg}}{\text{SD}} = \frac{114 - 90}{24} = \textcircled{1}$$



ii) What percentile is she in? (This is the same as asking what percent of the class drove slower than her.) Percentile = Area to the left +

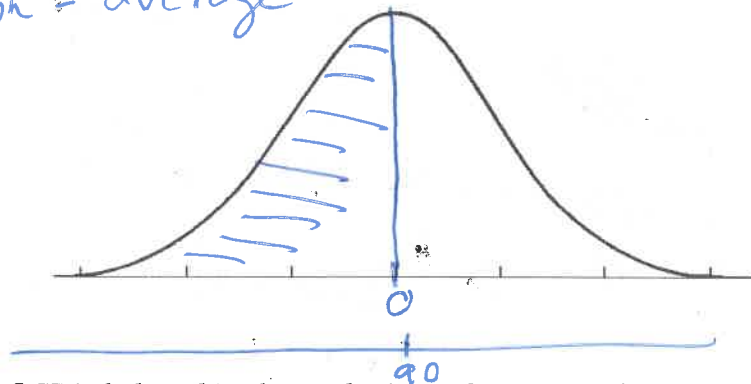
$$68\% + 16\% = \textcircled{84\%}$$

Do on your own

c) What percent of the class never drove above 90 mph?

$$\textcircled{50\%}$$

because 90 mph = average



d) If the fastest I've ever driven is 0.5 SD's below this class, what's my fastest speed?

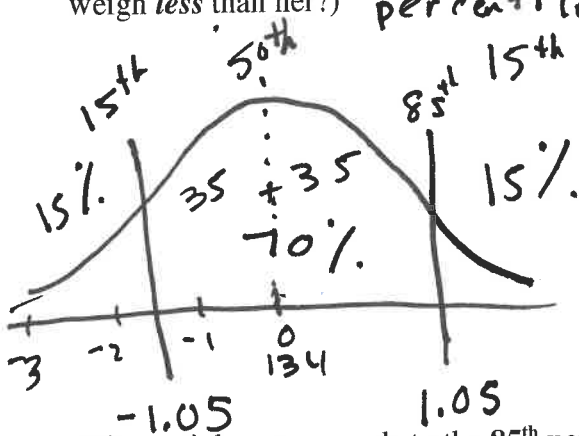
0.5 SD \downarrow average

0.5(24) below 90

$$12 \text{ below } 90 = \textcircled{78}$$

Example 7 According to last semester's survey data, the histogram for the weights of female Stat 100 students has an average of 134 lbs. and an SD of 24 lbs. Also, the weights of female Stat 100 students follow the normal curve.

What weight corresponds to the 15th percentile? (How much does she weigh if only 15% of the students weigh less than her?)



percentile \rightarrow z \rightarrow value

neg
what
middle
area?
70%

$z = -1.05$

value = avg + z(SD)

$134 + (-1.05)(24)$

$134 - 25.2$
108.8 lbs

What weight corresponds to the 85th percentile? (How much does she weigh if 85% of the students weigh less than her?)

percentile \rightarrow z \rightarrow value

85th

1.05

$134 + 1.05(24)$

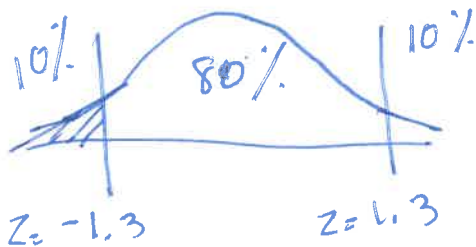
$134 + 25.2 =$

159.2 lbs

If 2 percentiles add to 100% then they have opposite sign

What weight corresponds to the 10th percentile? (How much does she weigh if 10% of the students weigh less than her?)

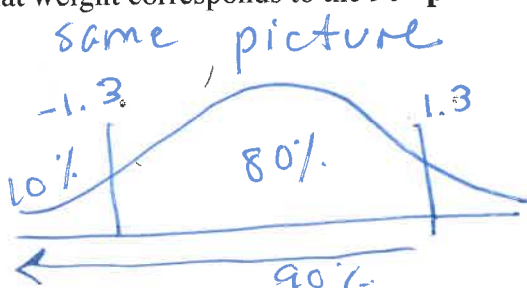
Do you own?



z
-1.3

\rightarrow value
 $134 + (-1.3)(24) =$
1102.8 lbs

What weight corresponds to the 90th percentile? (Hint: No work necessary!)



same picture

z
1.3

\rightarrow value
 $134 + 1.3(24) =$
165.2 lbs

Example 10a: What is the probability of drawing 3 cards from a deck with replacement and getting no hearts?

$$\left(\frac{39}{52}\right)^3$$

Example 10b: What is the probability of drawing 3 cards from a deck without replacement and getting no hearts?

$$\frac{39}{52} \cdot \frac{38}{51} \cdot \frac{37}{50}$$

Example 11a: What is the probability of drawing 3 cards from a deck with replacement and getting at least one heart?

$$P(\text{At least one } \heartsuit) = 1 - P(\text{No } \heartsuit) = 1 - \left(\frac{39}{52}\right)^3$$

Example 11b: What is the probability of drawing 3 cards from a deck without replacement and getting at least one heart?

$$1 - \frac{39}{52} \cdot \frac{38}{51} \cdot \frac{37}{50}$$

Example 12a: What is the probability of drawing 3 cards from a deck with replacement and getting all hearts?

$$P(\text{All } \heartsuit) = \left(\frac{13}{52}\right)^3$$

Example 12b: What is the probability of drawing 3 cards from a deck without replacement and getting all hearts?

$$\frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50}$$

Example 13a: What is the probability of drawing 3 cards from a deck with replacement and not getting all hearts?

$$P(\text{Not all } \heartsuit) = 1 - P(\text{All } \heartsuit) = 1 - \left(\frac{13}{52}\right)^3$$

Example 13b: What is the probability of drawing 3 cards from a deck without replacement and not getting all hearts?

$$1 - \frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50}$$