

Example – Water Taxi Safety

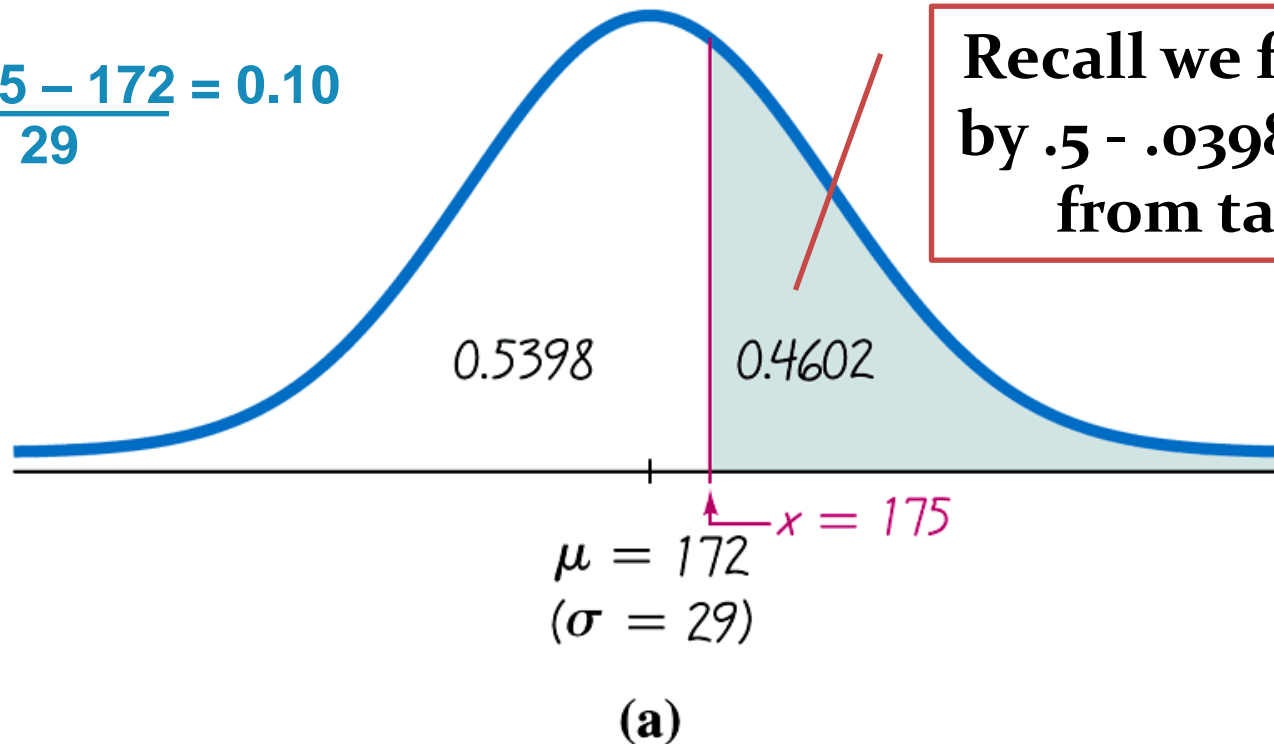
Given the population of men has normally distributed weights with a mean of 172 lb and a standard deviation of 29 lb,

- a) if one man is randomly selected, find the probability that his weight is greater than 175 lb.

- b) if 20 different men are randomly selected, find the probability that their mean weight is greater than 175 lb (so that their total weight exceeds the safe capacity of 3500 pounds).

a) if one man is randomly selected, find the probability that his weight is greater than 175 lb.

$$z = \frac{175 - 172}{29} = 0.10$$

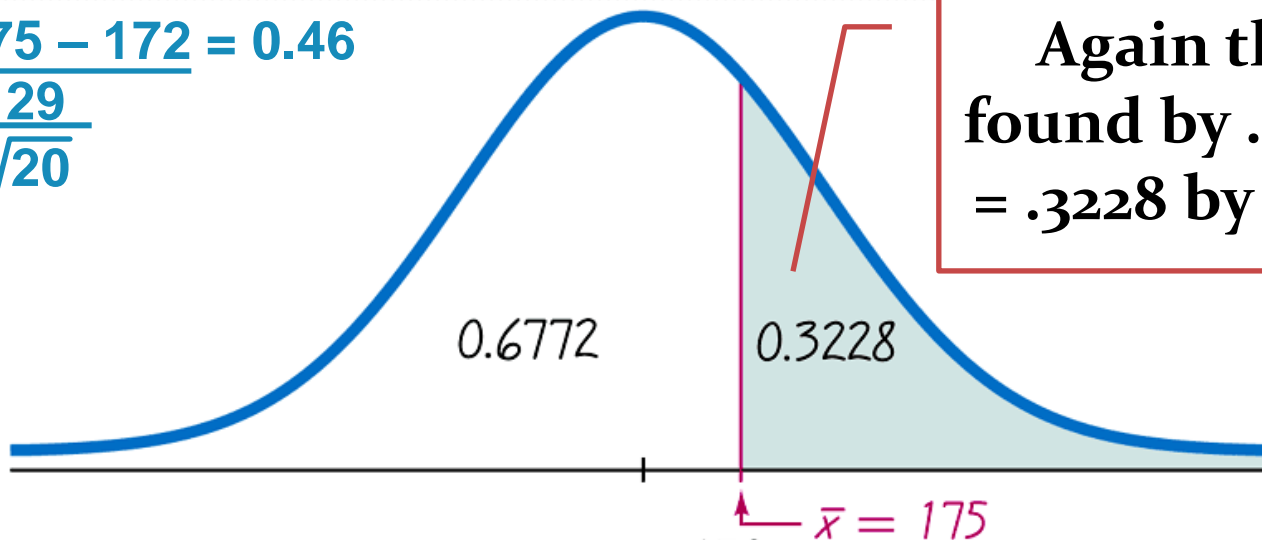


Recall we find this by $.5 - .0398 = .4602$ from table 4

(a)

- b) if 20 different men are randomly selected, find the probability that their mean weight is greater than 172 lb.

$$Z = \frac{175 - 172}{\frac{29}{\sqrt{20}}} = 0.46$$



Again this is found by $.5 - .1772 = .3228$ by table 4

$$\mu_{\bar{x}} = 172$$
$$(\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{29}{\sqrt{20}} = 6.4845971)$$

(b)

- a) if one man is randomly selected, find the probability that his weight is greater than 175 lb.

$$P(x > 175) = 0.4602$$

- b) if 20 different men are randomly selected, their mean weight is greater than 175 lb.

$$P(\bar{x} > 175) = 0.3228$$

It is much easier for an individual to deviate from the mean than it is for a group of 20 to deviate from the mean.

Interpretation of Results

Given that the safe capacity of the water taxi is 3500 pounds, there is a fairly good chance (with probability 0.3228) that it will be overloaded with 20 randomly selected men.