

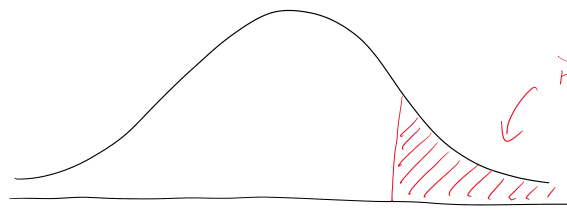
Section 9.4: The Normal Distribution:

Wednesday, April 03, 2024 11:10 AM

Finding values from probabilities

in the last section, we learned how to compute probabilities given x -values (or z -scores)

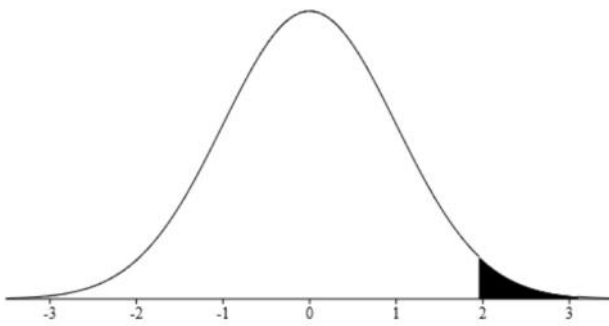
in this section, we'll compute x (or z), given probabilities



if this shaded area is 0.15,

then what is this value of x ? (or z)

how do you do that? online calculator



- Area from a value (Use to compute p from Z)
- Value from an area (Use to compute Z for confidence intervals)

← notice we are now using the second option

Specify Parameters:

Area
Mean
SD

} input

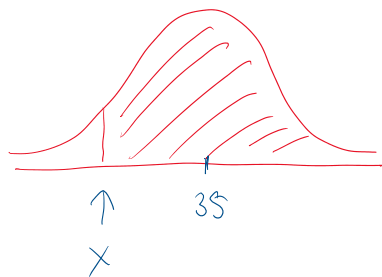
Results:

Recalculate
 Above
 Below
 Between
 Outside

} choose one of 4 options, which gives our answer

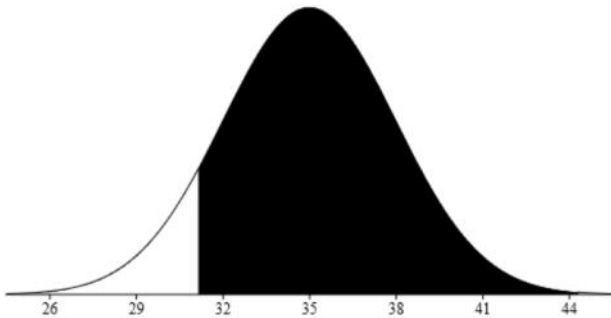
example: A botanist is studying the growth of a certain type of tomato plant. She finds that under certain growing conditions, the diameter is normally distributed with a mean of 35 mm and a standard deviation of 3 mm.

90% of these tomato plants will have a diameter larger than a certain value. Calculate that value.



mean = 35 mm
standard deviation = 3 mm

$$p = 0.90$$



- Area from a value (Use to compute p from Z)
- Value from an area (Use to compute Z for confidence intervals)

Specify Parameters:

Area
Mean
SD

Results:

Above
 Below
 Between
 Outside

$$x = 31.155 \text{ mm}$$

$$= 31.2$$

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example: The time it takes a student to write the stat 157 final exam is normally distributed with a mean of 2 hours 35 min

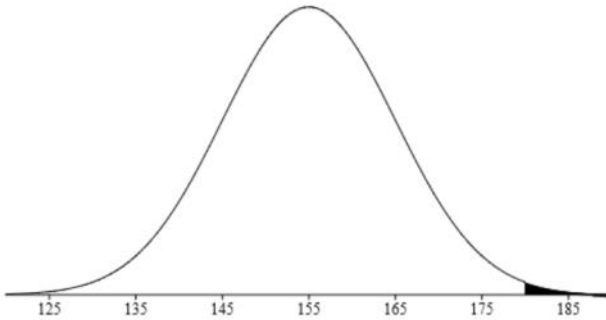
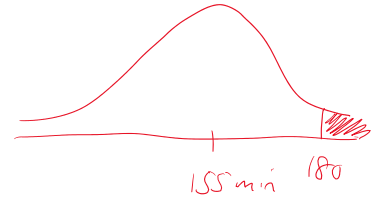
and a standard deviation of 10 minutes.

a) what is the probability that a randomly-chosen student will still be writing at the 3-hour mark?

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$$\begin{aligned} \text{mean} &= 2\text{h } 35\text{ min} = 155\text{ min} \\ \text{std dev} &= 10\text{ min} \end{aligned}$$

$$x = 3\text{ h} = 180\text{ min}$$



- Area from a value (Use to compute p from Z)
- Value from an area (Use to compute Z for confidence intervals)

Specify Parameters:

Mean

SD

Above

Below

Between and

Outside and

Results:

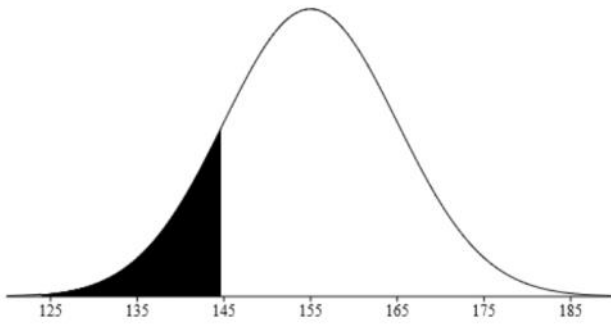
Area (probability)

$$P = 0.0062$$

$$= 0.62\%$$

b) the fastest 15% of students will complete the exam in a certain amount of time. Calculate that time.





- Area from a value (Use to compute p from Z)
- Value from an area (Use to compute Z for confidence intervals)

Specify Parameters:

Area

Mean

SD

Results:

Above

Below

Between

Outside

$$\begin{aligned} \bar{x} &= 144.636 \text{ min} \\ &= 145 \text{ min} \end{aligned}$$

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