

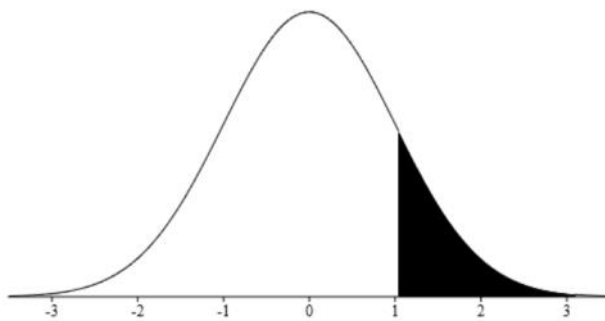
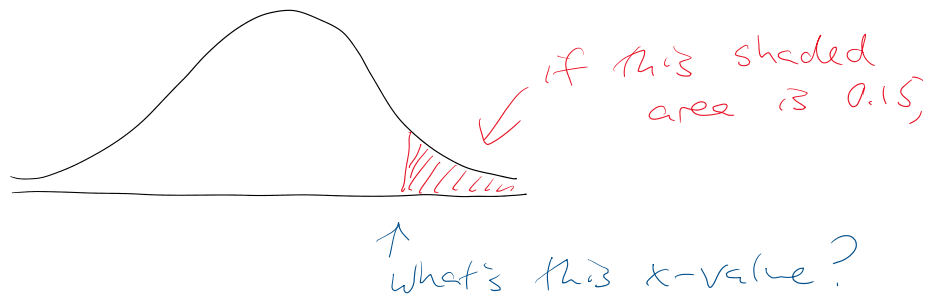
Section 9.4: The Normal Distribution:

Thursday, November 30, 2023 4:23 PM

Finding values from probabilities

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

in this section, we'll compute x (or z) from the probability



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

← notice that we are now using the second option

Specify Parameters:

Area
Mean
SD

} input these

Results:

Recalculate
 Above
 Below
 Between
 Outside

} choose one option

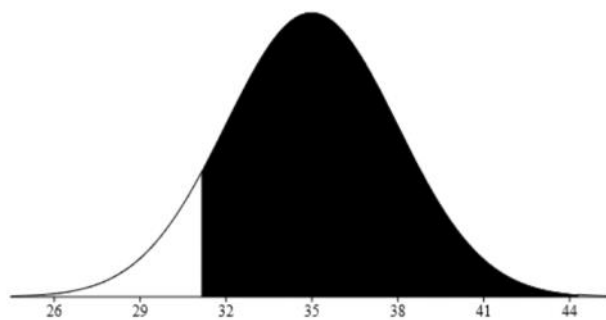
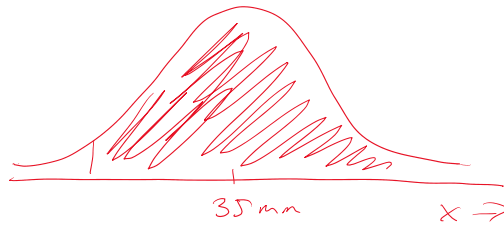
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this is our answer

example: A botanist is studying the growth of a certain type of tomato plant. She ...

example: A biologist 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 std. dev of 3 mm.

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



- 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

$x = 31.155 \text{ mm}$

$= 31 \text{ mm or } 31.2 \text{ mm}$

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example: The time it takes a student to write the Stat 157 final is normally distributed with a mean of 2 hours 35 minutes and a std dev of 10 minutes

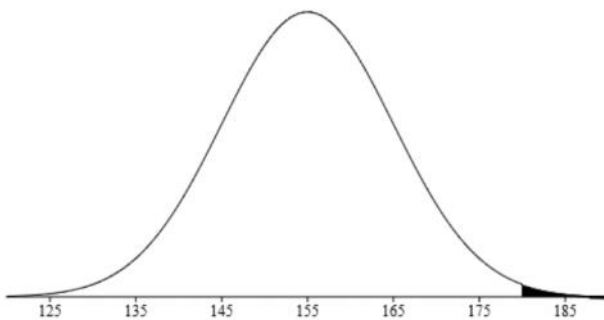
a) what is the probability that a randomly-chosen

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

$$\text{mean} = \mu = 2\text{h } 35\text{ min} = 155\text{ min}$$

$$\text{std dev} = \sigma = 10\text{ min}$$

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



- 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

$$p = 0.0062$$

$$= 0.62\%$$

Results:

Area (probability)

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b) in a class of 180 students, how many students on average will still be writing at the 3 hour mark?

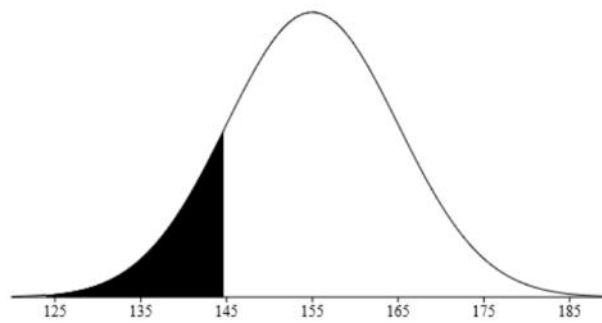
$$P(\text{still writing}) = \frac{n(\text{still writing})}{n_{\text{tot}}}$$

$$0.0062 = \frac{n(\text{still writing})}{180}$$

$$n_{\text{sw}} = 180 (0.0062) = 1.116 \text{ students}$$

= 1 student

c) 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

time = 144.636 min

= 145 min

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