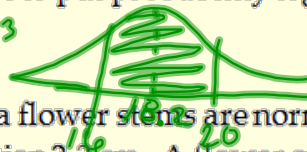


S.7 Probability and the Normal Distribution

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For the final challenge, we have to put probability together with the normal distribution.

$$\sigma = 2.3$$



1. The lengths of sweet pea flower stems are normally distributed with mean 18.2 cm and standard deviation 2.3 cm. A flower can be sold if its stem is between 16 cm and 20 cm.

- a) Find the probability that a flower chosen at random can be sold.

$$\text{normalcdf}(16, 20, 18.2, 2.3)$$

$$\boxed{0.614}$$

- b) Out of 500 flowers, how many can expect to be sold?

$$500 \cdot (0.614) \approx 307 \text{ flowers}$$

- c) Two flowers are chosen at random. Find the probability that both can be sold.

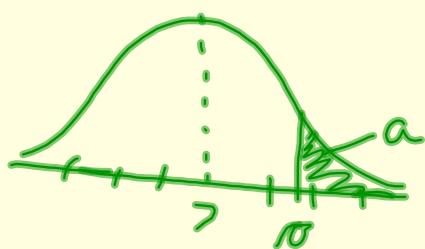
$$(0.614)^2 = 0.377$$

- d) Ten flowers are chosen at random. Find the probability that exactly five can be sold.

$$\binom{10}{5} (0.614)^5 (0.386)^5 = 0.188$$

2. Joseph and four friends are playing a game rolling two dice. The winning numbers are normally distributed with a mean of 7 and a standard deviation of 2.4. Joseph wins the game if he rolls a 10 or higher.

- a) What is the probability that Joseph wins the game?



$$\sigma = 2.4$$

$$\text{normalcdf}(10, 1E99, 7, 2.4)$$

$$= 0.106$$

- b) What is the probability that all 5 friends win the game?

$$0.106^5 = 0.0000139$$

- c) What is the probability that at least three of the five friends win the game?

$$\binom{5}{3} (0.106)^3 (0.894)^2 + \binom{5}{4} \dots + \binom{5}{5} \dots$$

$$= 0.0101$$

