18.9. The problem is giving us information on the cause of death for individuals in the United States:

Outcome	Heart disease	Cancer	Other
Probability	0.34	0.23	??

The probability a death is due to heart disease or cancer is

$$P(\text{Heart disease}) + P(\text{Cancer}) = 0.34 + 0.23 = 0.57.$$

Because the probabilities in the model above must add up to 1, the probability associated with "Other" causes is 0.43.

18.13. (a) In a probability model, the outcome probabilities must add to 1 (or 100%).
(b) We have

$$P(\text{Far Left}) = 0.04 \implies P(\text{not Far left}) = 1 - 0.04 = 0.96.$$

(c) We add the two outcome probabilities together:

$$P(\text{Conservative}) + P(\text{Far right}) = 0.20 + 0.02 = 0.22.$$

18.15. There are $2 \times 2 \times 2 = 8$ different arrangements. They are

BBB BBG BGB GBB BGG GBG GGB GGG

If all 8 arrangements (outcomes) are equally likely, then the probability of each arrangement is

$$\frac{1}{8} = 0.125.$$

(b) Simply add up the probabilities associated with the "2 girl, 1 boy" outcomes:

$$P(\text{BGG}) + P(\text{GBG}) + P(\text{GGB}) = \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{3}{8} = 0.375.$$

18.20. The authors are asking you to assume the population proportion of all American adults who "believe the level of immigration to the United States should be decreased" is

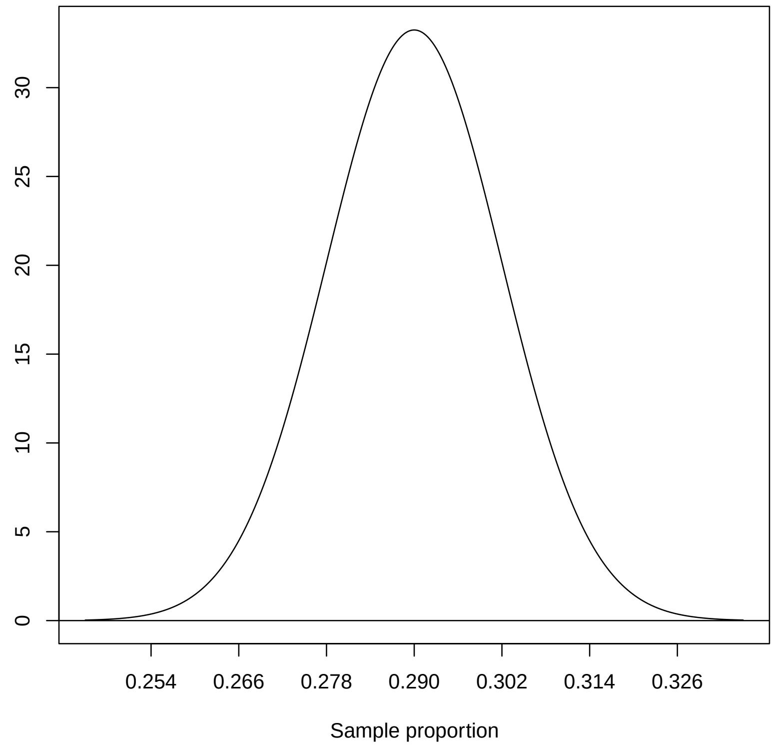
$$p = 0.29.$$

If the opinion poll is a **SRS** of $n = 1520$ American adults, then the distribution of the sample proportion $\widehat{p}$ who believe the level of immigration to the United States should be decreased

- will be approximately normal (it will follow a normal density curve approximately)
- will have mean $p = 0.29$
- will have standard deviation

$$\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.29(1-0.29)}{1520}} \approx 0.012.$$

This normal distribution is shown below with tick marks at ± 1 standard deviation, ± 2 standard deviations, and ± 3 standard deviations:



This distribution is a probability model for the sample proportion $\widehat{p}$ if a SRS of size $n = 1520$ American adults was used.

(a) Use the 68-95-99.7 rule. We know that 95% of the sample proportions $\widehat{p}$ will be between 0.266 and 0.314. These values are two standard deviations from the mean (see figure above).
(b) Use the 68-95-99.7 rule. We know that 68% of the sample proportions $\widehat{p}$ will be between 0.278 and 0.302. Therefore, 16% of the sample proportions will be below 0.278 (and 16% of them will be above 0.302).

18.24. The authors are asking you to assume the population proportion of all American adults who jog is

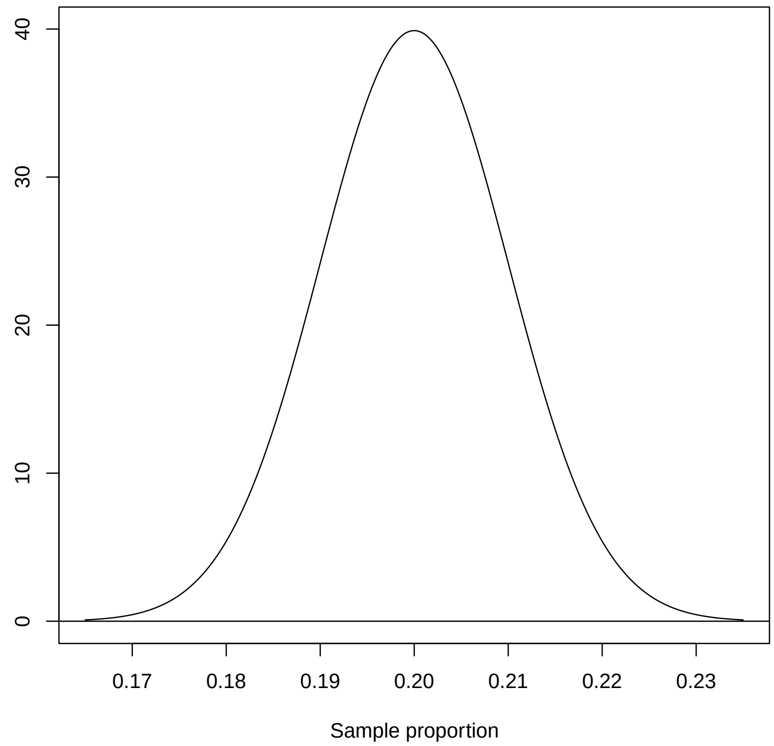
$$p = 0.20.$$

If the opinion poll is a **SRS** of $n = 1500$ American adults, then the distribution of the sample proportion $\widehat{p}$ who jog

- will be approximately normal (it will follow a normal density curve approximately)
- will have mean $p = 0.20$
- will have standard deviation

$$\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.20(1-0.20)}{1500}} \approx 0.01.$$

This normal distribution is shown below with tick marks at ± 1 standard deviation, ± 2 standard deviations, and ± 3 standard deviations:



This distribution is a probability model for the sample proportion $\widehat{p}$ if a SRS of size $n = 1500$ American adults was used.

(a) This probability is 0.5. 50% of the samples would produce a sample proportion $\widehat{p}$ below the mean; 50% of the samples would produce a sample proportion above mean.
(b) Use the 68-95-99.7 rule. We know that 95% of the sample proportions $\widehat{p}$ will be between 0.18 and 0.22. These values are two standard deviations from the mean (see figure above).
(c) If 95% of the sample proportions $\widehat{p}$ will fall between 0.18 and 0.22, then 5% of the sample proportions would not fall between these two values; i.e.,

- 2.5% of the sample proportions would be less than 0.18.
- 2.5% of the sample proportions would be greater than 0.22.