b. The range of the population is 12, but the mean of the sample ranges is 5.375. Those values are not equal.
c. The sample ranges do not target the population range of 12, so sample ranges do not make good estimators of population ranges.

15.

Proportion of Girls	Probability
0	0.25
0.5	0.50
1	0.25

Yes. The proportion of girls in 2 births is 0.5, and the mean of the sample proportions is 0.5. The result suggests that a sample proportion is an unbiased estimator of a population proportion.

17. a.

Proportion Correct	Probability
0	16/25
0.5	8/25
1	1/25

b. 0.2
c. Yes. The sampling distribution of the sample proportions has a mean of 0.2 and the population proportion is also 0.2 (because there is 1 correct answer among 5 choices). Yes, the mean of the sampling distribution of the sample proportions is always equal to the population proportion.

19. The formula yields $P(0) = 0.25$, $P(0.5) = 0.5$, and $P(1) = 0.25$, which does describe the sampling distribution of the sample proportions. The formula is just a different way of presenting the same information in the table that describes the sampling distribution.

Section 6-5

1. Because $n > 30$, the sampling distribution of the mean ages can be approximated by a normal distribution with mean μ and standard deviation $\sigma/\sqrt{40}$.
3. $\mu_{\bar{x}} = 60.5$ cm and it represents the mean of the population consisting of all sample means. $\sigma_{\bar{x}} = 1.1$ cm, and it represents the standard deviation of the population consisting of all sample means.
5. a. 0.9772
b. 0.8888 (Tech: 0.8889)
7. a. 0.0668
b. 0.6985 (Tech: 0.6996)
c. Because the original population has a normal distribution, the distribution of sample means is normal for any sample size.
9. a. 0.9974 (Tech: 0.9973)
b. 0.5086 (Tech: 0.5085)
11. 0.1112 (Tech: 0.1121). The elevator does not appear to be safe because there is a reasonable chance (0.1112) that it will be overloaded with 16 male passengers.
13. a. 0.9787 (Tech: 0.9788)
b. 21.08 in. to 24.22 in.
c. 0.9998. No, the hats must fit individual women, not the mean from 64 women. If all hats are made to fit head circumferences between 22.00 in. and 23.00 in., the hats won't fit about half of those women.
15. a. 140 lb
b. 0.9999 (Tech: 0.99999993, or 1.0000 when rounded to four decimal places)
c. 0.8078 (Tech: 0.8067)
d. Given that there is a 0.8078 probability of exceeding the 3500 lb limit when the water taxi is loaded with 20 random men, the new capacity of 20 passengers does not appear to be safe enough because the probability of overloading is too high.
17. a. 0.6517 (Tech: 0.6516)
b. 0.9115
c. There is a high probability (0.9115) that the gondola will be overloaded if it is occupied by 12 men, so it appears that the number of allowed passengers should be reduced.
19. a. 0.5526 (Tech: 0.5517)
b. 0.9994 (Tech: 0.9995)
c. Part (a) because the ejection seats will be occupied by individual women, not groups of women.
21. a. 0.8508 (Tech: 0.8512)
b. 0.9999 (Tech: 1.0000 when rounded to four decimal places)
c. The probability from part (a) is more relevant because it shows that 85.08% of male passengers will not need to bend. The result from part (b) gives us information about the mean for a group of 100 men, but it doesn't give us useful information about the comfort and safety of individual male passengers.
d. Because men are generally taller than women, a design that accommodates a suitable proportion of men will necessarily accommodate a greater proportion of women.
23. a. Yes. The sampling is without replacement and the sample size of $n = 50$ is greater than 5% of the finite population size of 275. $\sigma_{\bar{x}} = 2.0504584$.
b. 0.5947 (Tech: 0.5963)
25. a. $\mu = 6.0$ and $\sigma = 2.1602469$
b. 4.5, 4.5, 6.5, 6.5, 7.0, 7.0
c. $\mu_{\bar{x}} = 6.0$ and $\sigma_{\bar{x}} = 1.0801235$
d. $\mu_{\bar{x}} = \mu = 6.0$ and $\sigma_{\bar{x}} = \frac{2.1602469}{\sqrt{2}}\sqrt{\frac{3-2}{3-1}} = 1.0801235$, which is the same result from part (c).

Section 6-6

1. The histogram should be approximately bell-shaped, and the normal quantile plot should have points that approximate a straight-line pattern.
3. We must verify that the sample is from a population having a normal distribution. We can check for normality using a histogram, identifying the number of outliers, and constructing a normal quantile plot.
5. Not normal. The points show a systematic pattern that is not a straight-line pattern.
7. Normal. The points are reasonably close to a straight-line pattern, and there is no other pattern that is not a straight-line pattern.
9. Not normal
11. Normal