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## SHOW YOUR WORK                    EXPLAIN YOUR ANSWERS

**8.22** The heights of 1000 students are approximately normally distributed with a mean of 174.5 centimeters and a standard deviation of 6.9 centimeters. Suppose 200 random samples of size 25 are drawn from this population and the means recorded to the nearest tenth of a centimeter. Determine

(a) the mean and standard deviation of the sampling distribution of $\bar{X}$;

(b) the number of sample means that fall between 172.5 and 175.8 centimeters inclusive;

(c) the number of sample means falling below 172.0 centimeters.

**8.41** Assume the sample variances to be continuous measurements. Find the probability that a random sample of 25 observations, from a normal population with variance $\sigma^2 = 6$, will have a sample variance $S^2$

(a) greater than 9.1;

(b) between 3.462 and 10.745.

**8.51** For an $F$-distribution, find

(a) $f_{0.05}$ with $v_1 = 7$ and $v_2 = 15$;

(b) $f_{0.05}$ with $v_1 = 15$ and $v_2 = 7$:

(c) $f_{0.01}$ with $v_1 = 24$ and $v_2 = 19$;

(d) $f_{0.95}$ with $v_1 = 19$ and $v_2 = 24$;

(e) $f_{0.99}$ with $v_1 = 28$ and $v_2 = 12$.

**8.25** The average life of a bread-making machine is 7 years, with a standard deviation of 1 year. Assuming that the lives of these machines follow approximately a normal distribution, find

(a) the probability that the mean life of a random sample of 9 such machines falls between 6.4 and 7.2 years;

(b) the value of $x$ to the right of which 15% of the means computed from random samples of size 9 would fall.

**8.48** A manufacturing firm claims that the batteries used in their electronic games will last an average of 30 hours. To maintain this average, 16 batteries are tested each month. If the computed $t$-value falls between $-t_{0.025}$ and $t_{0.025}$, the firm is satisfied with its claim. What conclusion should the firm draw from a sample that has a mean of $\bar{x} = 27.5$ hours and a standard deviation of $s = 5$ hours? Assume the distribution of battery lives to be approximately normal.