

Name: _____

Class period: _____

Ch 5.3 and 5.4 review

1. For a given population of high school seniors, the Scholastic Aptitude Test (SAT) in mathematics has a mean score of 500 with a standard deviation of 100. Another widely used test is American College Testing (ACT) exam. The mathematics portion of the ACT has a mean of 18 and a standard deviation of 6. (For more information, see Web site <<http://www.collegeboard.org>>.) Both SAT and ACT scores are normally distributed. What is the probability that a randomly selected high school senior's score on the mathematics part of the SAT will be

- (a) more than 675?
- (b) less than 450?
- (c) between 450 and 675?

What is the probability that a randomly selected high school senior's score on the mathematics part of the ACT will be

- (d) more than 28?
- (e) more than 12?
- (f) between 12 and 28?

2. Please refer to SAT and ACT information from Problem 2.

- (a) Suppose that an engineering school honor's program will accept only high school seniors with a mathematics SAT or ACT score in the top 10%. What is the minimum SAT score in mathematics for this program? What is the minimum ACT score in mathematics for this program?
- (b) Suppose that an engineering school will accept only high school seniors with a mathematics SAT or ACT score in the top 20%. What is the minimum SAT score in mathematics for this program? What is the minimum ACT score in mathematics for this program?
- (c) Suppose that an engineering school will accept only high school seniors with a mathematics SAT or ACT score in the top 60%. What is the minimum SAT score in mathematics for this program? What is the minimum ACT score in mathematics for this program?

3. Quick Start Company makes 12-volt car batteries. After many years of product testing, the company knows that the average life of a Quick Start battery is normally distributed, with a mean of 45 months and a standard deviation of 8 months.
- (a) If Quick Start guarantees a full refund on any battery that fails within the 36-month period after purchase, what percentage of its batteries will the company expect to replace?
 - (b) If Quick Start does not want to replace more than 10% of its batteries under the full-refund guarantee policy, for how long should the company guarantee the batteries (to the nearest month)?
4. Accrotime is a company that manufactures quartz crystal watches. Accrotime researchers have shown that the watches have an average life of 28 months before certain electronic components deteriorate, causing the watch to become unreliable.
- The standard deviation of watch lifetimes is 5 months, and the distribution of lifetimes is normal.
- (a) If Accrotime guarantees a full refund on any defective watch for 2 years after purchase, what percentage of total production will the company expect to replace?
 - (b) If Accrotime does not want to make refunds on more than 12% of the watches it makes, how long should the guarantee period be (to the nearest month)?
5. At a ski area in Vermont, the daytime high temperature is normally distributed during January, with a mean of 22°F and a standard deviation of 10°F (U.S. Department of Commerce, *Environmental Data Services*). You are planning to ski there this January. What is the probability that you will encounter daytime highs of
- (a) 42°F or higher?
 - (b) 15°F or lower?
 - (c) between 29°F and 40°F?