HW 4-2 (Due Sep. 20, 2016) **Name:**

Print then work on it directly. Staple HW 4-1 and 4-2 together.

Problem 1

3.37 In 2003, the average combined SAT score (math and verbal) for college-bound students in the United States was 1026. Suppose that approximately 45% of all high school graduates took this test and that 100 high school graduates are randomly selected from among all high school grads in the United States. Which of the following random variables has a distribution that can be approximated by a binomial distribution? Whenever possible, give the values for n and p.

a The number of students who took the SAT

b The scores of the 100 students in the sample

c The number of students in the sample who scored above average on the SAT

d The amount of time required by each student to complete the SAT

e The number of female high school grads in the sample

Problem 2

3.40 The probability that a patient recovers from a stomach disease is .8. Suppose 20 people are known to have contracted this disease. What is the probability that

a exactly 14 recover?

b at least 10 recover?

c at least 14 but not more than 18 recover?

d at most 16 recover?

Problem 3

3.41 A multiple-choice examination has 15 questions, each with five possible answers, only one of which is correct. Suppose that one of the students who takes the examination answers each of the questions with an independent random guess. What is the probability that he answers at least ten questions correctly?

Problem 4

3.45 A fire-detection device utilizes three temperature-sensitive cells acting independently of each other in such a manner that any one or more may activate the alarm. Each cell possesses a probability of $p = .8$ of activating the alarm when the temperature reaches 100° Celsius or more. Let Y equal the number of cells activating the alarm when the temperature reaches 100°.

a Find the probability distribution for Y.

b Find the probability that the alarm will function when the temperature reaches 100°.

Problem 5

3.50 A missile protection system consists of n radar sets operating independently, each with a probability of .9 of detecting a missile entering a zone that is covered by all of the units.

a If $n = 5$ and a missile enters the zone, what is the probability that exactly four sets detect the missile? At least one set?

b How large must n be if we require that the probability of detecting a missile that enters the zone be .999?