This exam will cover sections 7.4-8.3 and 9.1-9.6 in your text. You should know general terms and definitions from each of these sections, review the homework and quizzes given for these sections, and pay particular attention to the subjects and practice problems mentioned below.

1. Using tree diagrams and probability.
2. Finding conditional probability using the conditional probability formula.
3. Determining of two events are independent.
4. Finding the probability of an intersection of independent events.
5. Finding Bayesian probabilities (using conditional probability formula).
6. Identifying Bernoulli trials and finding binomial probabilities.
7. Computing the expected value of an experiment.
8. Identify continuous and discrete variables.
9. identifying sources of bias in a sample.
10. Construct a simple bar or pie chart.
11. Form a frequency table and construct a line chart.
12. Group data into class intervals and draw a histogram with a frequency polygon.
13. Computing the mean, median, and mode of a set of data.
14. Computing the range and standard deviation of a set of data.
15. Apply Chebychev’s theorem.
16. Compute Z-scores and use them to determine area under a normal curve from provided tables.
17. Using the normal distribution to approximate the binomial distribution.

Below is a list of sample problems. This list is not all-inclusive, but does represent the basic types of problems you may see on the exam.

1. An urn contains 12 numbered balls: 8 red and 4 blue. Three of the red balls have even numbers, and one of the blue has an even number. The rest of the balls have odd numbers.
   (a) What is the probability of drawing a red ball?
   (b) What is the probability of drawing a red ball given that you draw an even numbered ball?
   (c) What is the probability of drawing an odd numbered ball?
   (d) What is the probability of drawing an odd numbered ball given that you draw a blue ball?
   (e) Are either of the pairs of events: (red, even) and (odd, blue) independent?

2. In the experiment above, suppose that you pay $1.00 to draw a ball. An odd numbered red ball gets you nothing. An even numbered red ball pays you your $1.00 back. An odd numbered blue ball gets you $5.00 back, and the even numbered blue ball pays you $10.00 back. What is the expected value of this game?

3. A widget factory creates two types of widgets: type A and type B. Type A widgets are defective 5% of the time, and type B widgets are defective 10% of the time. If the factory produces 20 type A and 60 type B widgets in a given day, and a randomly selected widget is defective, what is the probability that it is type A? If a randomly selected widget is not defective, what is the probability it is type B?
4. A student takes a multiple choice test made up of 10 questions. Each question has five possible answers, one of which is correct.

(a) If the student guesses, what is the probability that she will get exactly 6 correct?
(b) What is the probability that she will get at least 8 correct?
(c) If she manages to narrow each question down to three possible answers, what will her expected score be?
(d) If the same students takes a comprehensive final with 50 multiple choice questions, each with five answers, what is the probability that guessing will get her a score of at least 15 out of 50? Use a normal distribution to approximate this answer.

5. Use the following table of values to perform the tasks listed below.

| 12 | 18 | 10 | 15 | 12 | 17 | 13 | 11 | 11 | 18 | 6 |

(a) Construct a histogram for this data, in which your class intervals have a width of 3.
(b) Find the median and mode of this data.
(c) Suppose that you sampled 4 values from this data at random and selected: 15, 11, 18, 6. Calculate the mean and standard deviation of these 4 values.
(d) An outlier is a value which is either extremely large or extremely small for a given set of data. Identify an outlier in you sample above, remove it, and redo your calculations with the three remaining values. What do you notice?

6. Suppose that the weights, in pounds, of a certain group of individuals follows a normal distribution \( \mu = 175 \) and \( \sigma = 12.5 \). If an individual is selected from this group at random, find:

(a) the probability that the individual weighs more than 175 pounds.
(b) the probability that the individual weighs between 162.5 and 187.5. (Hint: no table required!)
(c) the probability that the individual weighs between 155 and 175.
(d) the probability that the individual weighs less than 155 pounds.
(e) the probability that the individual weighs between 190 and 210.