

Exam 1 Review Sheet

This exam covers chapters 12 and 13.

Vocabulary

You may be asked to state the definitions of some of the following vocabulary.

- Random variable (page 709)
- Expected value for a discrete random variable (page 712)
- Variance, standard deviation for a discrete random variable (page 714)
- Probability density function (page 731)
- Expected value, variance and standard deviation for a continuous random variable (page 739)

You will not be asked to state the following, but you should be able to use them to solve problems and answer questions.

- Intersection (page 663), union (page 664), complement (page 662), Venn Diagrams (page 662)
- Sample space, outcomes (page 675)
- Event (page 676)
- Probability (page 677)
- Conditional probability (page 693)
- Product Rule for probability (page 695)
- Probability distribution for discrete random variables (page 710)
- Histogram (page 710)
- Continuous random variable (page 730)
- Exponential distribution (page 749); know what the graph looks like
- Normal distribution (page 750); know what the graph looks like
- Z-scores theorem (page 752)

The following list describes the content of the exam. After each type of problem, there is a list of examples and exercises. A very effective way to prepare for a math (or chemistry) test is to read the example problems, try to solve them yourself, and then check your answer. Repeat each exercise until you get it right without looking at the solution.

Section 12.1

You *may* be asked to

- Use given information to write the numbers of elements or probabilities in each region of a Venn diagram. **Practice:** Example 10 page 666, #58 page 671, #73-75 page 673, #66 page 688, Example 2 page 694.
- Label the regions of a Venn diagram with its name (for example $A \cap B \cap C'$). **Practice:** Hand graded homework 12.1 (I.A.i.), #31, 33, 38,41 page 670 (these are different, but related).
- Read information given in set notation off of a table. **Practice:** Example 12 page 668, #59-66 page 671-672.

Section 12.2

You *will* be asked to

- List the elements in a sample space and/or an event for a given experiment and calculate probabilities. **Practice:** Examples 1, 3, 5, 6, 7, 8 pages 674-681, #15-29 pages 15-29.

You *may* be asked to

- Calculate probabilities using information given in a table. **Practice:** Example 11 page 683, #71 page 689, #75 page 690.

Section 12.3

You *will* be asked to

- Calculate conditional probabilities (the probability that something happens given that something else happened). **Practice:** Examples 2 and 3 page 694, #1-6 page 703. Sometimes these problems can be best solved using a tree diagram. **Practice:** Example 5 page 696, #7-14 page 703.

You *may* be asked to

- Calculate conditional probabilities from a table. **Practice:** Example 1 page 693, #38 page 705.
- Use the product rule for probabilities. **Practice:** #51 page 707.

Section 12.4

You *will* be asked to

- Construct a probability distribution for a given random variable. **Practice:** Example 1 page 711, #1, 2 page 717.
- Calculate the expected value and possibly the variance and standard deviation for a given random variable. **Practice:** Example 2 page 712, #5-12 page 718.

You *may* be asked to

- Construct a histogram for a given random variable. **Practice:** Example 1 page 711, #3, 4 page 718.

Section 13.1

You *will* be asked to

- Calculate probabilities using a probability density function. **Practice:** Example 3 page 733, #27, 33 page 736, see also #11-14 page 744, parts d and e. These may involve integrating x^n (for n not equal to -1), x^{-1} , or e^{kx} using the formulas.
 - Power rule for integration: **Practice:** Example 4 page 371, Example 5 page 372, #5, 9, 13, 21, page 373.
 - Integral of x^{-1} . **Practice:** Example 7 page 374, #31, 33 page 373.
 - Integral of e^{kx} . **Practice:** Example 8 page 375, #33, 35 page 373

You *may* be asked to

- Shade areas on the graph of a probability density function representing given probabilities. See Figure 2 page 730, Example 3 page 753.
- Determine whether or not a given function is a probability density function on a given interval. **Practice:** Example 1 page 731, #3-8 page 735.

Section 13.2

You *will* be asked to

- Calculate the mean (expected value) and standard deviation of a continuous random variable, given a formula for its probability density. **Practice:** Example 1, 2, 3 pages 740-742, #11-14 page 744, #21, 23, 25 page 745. Also, #1-8 page 744.

You *may* be asked to

- Determine the probability that a random variable is within a given number of standard deviations of its mean. **Practice:** #11-14 page 744 part e.

Section 13.3

You *will* be asked to

- Compute probabilities of a normally distributed random variable. **Practice:** Example 3 page 753. This will include calculating a z-score and looking the value up on the table. Know and be able to use the formula for the z-score; the table will be provided.

You *may* be asked to

- Compute probabilities, expected value and/or standard deviation of an exponentially distributed random variable. Know and be able to use the formula for the exponential probability density function. **Practice:** Example 2 page 750, #3, 5 page 756, #29 page 758.