DIRECTIONS:

• Work textbook exercises in the order shown. (This order provides maximum benefit.)
• See How To Succeed With Stats Homework on page 2 of the syllabus.
• Collect your work in a binder. Check answers before going on to the next problem.
• Unless noted otherwise, carry all calculations and final answers to at least 4 decimal places (except when using the Binomial Table, which has only 3 places available.)

Textbook Exercises

Chapter 4 (begins on page 247)

Note: Exercises 4.57 and 4.62 are connected: They refer to the same data. You can make a single table to answer questions for both exercises.

• Exercise 4.57

• Exercise 4.62 Add part (b) to Exercise 4.62:

  (b) Would you recommend applying the Bell Curve Rule (using the answers for $\mu_X$ and $\sigma_X$) to hard-drive sizes? Briefly explain why or why not.

Note: Exercises 4.59, 4.63, and 4.66 are connected.

• Exercise 4.59

• Exercise 4.63 In this exercise calculate exactly (no rounding.) Then round final answers to 4 decimal places. Add two parts (c) and (d):

  (c) The total time to develop ($x$) and design ($y$) the new product is

  \[ T = x + y \]

  Find $\sigma_T =$ the standard deviation of $T$ by using Variance Rule 2 from the textbook box on page 253.

  (d) Suppose that the company has a goal to develop and design a new product in less than eight weeks. What’s the probability that the company misses the goal?

  Tip for (d): Consider probability distributions and the fact that they are independent.
Exercise 4.66  Do parts (a) and (b) only. Also add part (c):

(c) The company has set a goal that the total cost $T$ to both develop and design the next new product will be less than $50,000. Find the probability that the company meets the goal.

Exercise 4.64

Tip: Draw a bell curve for $(x - y)$. Sketch the “plus or minus” numbers on the bottom of the bell curve and consider probabilities (areas) under the curve.

Chapter 5  (begins on page 318)

Exercise 5.76  Add part (d):

(d) What’s the probability that the lie detector makes no mistakes?

Exercise 5.58  Add part (c):

(c) What’s the probability that five committee members are Hispanic if 42% of all the workers are Hispanic (instead of 30%)?

Exercise 5.62  Do textbook parts (a) and (b) only but add new parts (c) and (d):

(c) Use the Bell Curve Rule: How many Hispanics are almost always represented on a committee of 15 workers if the workers are randomly selected?

(d) Suppose that 12 Hispanics are on the actual chosen committee. What’s your conclusion?

Exercise 5.59  Add parts (b) and (c):

(b) What’s the probability that 11 or fewer graduate?

(c) Does the university’s claim seem plausible (reasonable), based on the evidence?

Exercise 5.60  The textbook refers to Table C but the Binomial table in the Notebook may be easier to use. Also add more parts:

(c) Suppose that 200 persons are contacted in a monthly restaurant survey. What’s the average or expected number of respondents in such a survey who seek nutritious food? What’s the standard deviation?

(d) Results from about 68% of monthly surveys will fall within what range of persons who seek nutritious food?

(e) Results from about 95% of monthly surveys will fall within what range of persons who seek nutritious food?

(f) Results from almost all monthly surveys will fall within what range of persons who seek nutritious food?

(g) If next month’s survey shows that 42 persons seek nutritious food when eating out, what’s your conclusion?
Additional Problems

1. A patient complaining of severe stomach pains checked into a local hospital. After a series of
tests, doctors determined that the patient has exactly one of four possible ailments, but it is
not known which. The doctors issued a medical profile for the patient which indicates that
there is a 40% chance that the patient has hepatitis, a 10% chance of cirrhosis, a 45% chance
of gallstones, and a 5% chance of cancer of the pancreas. The cost associated with treating
each ailment is shown in the table:

<table>
<thead>
<tr>
<th>Ailment</th>
<th>Hepatitis</th>
<th>Cirrhosis</th>
<th>Gallstones</th>
<th>Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$7000</td>
<td>$11,000</td>
<td>$32,000</td>
<td>$164,500</td>
</tr>
</tbody>
</table>

(a) Let $x =$ cost of treating the patient, in dollars. Write out the probability distribution.

(b) Find $\mu_x$. Then interpret this number (in English.)

(c) Suppose that further testing reveals that the patient has either hepatitis or cirrhosis
(i.e., gallstones and cancer have been ruled out as possibilities.) Given this additional
information, revise the probability distribution for $x$.

(d) Calculate $\mu_x$ from the revised probability distribution. Interpret this number.

between passive smoking and nasal allergies in female Japanese students. The study revealed
that 80% of students from heavy-smoking families showed signs of nasal allergies from physical
examinations. Consider a sample of 25 female Japanese students exposed daily to heavy
smoking.

(a) What’s the probability that fewer than 20 of the students will have nasal allergies?

(b) What’s the probability that more than 15 of the students will have nasal allergies?

(c) On average, how many of the 25 students would you expect to have nasal allergies?

3. A study based on a survey of 2000 adult women residing in Baltimore, Maryland indicates
that three in every 10 adult women has been a victim of harassment. As a check on the study,
suppose that interviews from a random sample of 15 adult women living in the area indicate
that four have been harassed.

(a) What’s the probability of observing four women who have been harassed in a sample of
15 if the proportion $p$ of women who are victims of harassment is really $p = 0.30$?

(b) One expert believes that the proportion of adult women who have been harassed in the
Baltimore area is closer to $p = 0.10$. Calculate the probability of observing four women
who have been harassed in a sample of 15 if $p = 0.10$.

(c) Based on the evidence, which claim about Baltimore ($p = 0.30$ or $p = 0.10$) is better
supported by the sample data? Support your answer with a numerical argument.

(continued)
4. (Calculate exact answers for the following problem)

A particular daily commuter train from New Jersey to New York city is late half of the time. Over the next five days, what’s the probability that the train is late

(a) on all five days?
(b) more than three days?

5. (This problem is multiple-choice. Choose the single best answer.)

The 50 boy scouts in a boy scout troop have paired up into two-person teams for the purpose of conquering a “ropes course.” The ropes course is a series of obstacles in the wilderness which must be overcome by climbing, balancing, jumping, or some other form of physical exertion.

A team is considered successful if both boys complete the course. Each team attempts to complete the course in isolation from the other teams. National boy scout figures are available for both the older boy and the younger boy on each team: 20% of all older boys fail to complete the course, but 50% of younger boys complete the course if the older boy does.

The scout leader has promised all 50 boys a steak dinner if more than half the teams finish the course. What’s the probability of a steak dinner?

(a) 0.100  (b) 0.154  (c) 0.400  (d) 0.762  (e) None of the answers is correct to the third decimal place

(end of assignment)