## Review Problems for Exam 2

**The following problems are meant to help you review for the exam. However, this review is not complete. To adequately study, you should review your notes, homework, class assignments, quizzes and labs. In addition, try the review problems in the book that are listed on the greensheet for Exam 2.**

1. The table shows the performance of the students of three classes taught by a certain Math instructor on the second test.

|  | Math 105 | Statistics | Finite Math | TOTAL |
|---|---|---|---|---|
| A | 7 | 12 | 10 | 29 |
| B | 15 | 11 | 16 | 42 |
| C | 12 | 8 | 11 | 31 |
| D | 5 | 9 | 4 | 18 |
| TOTAL | 39 | 40 | 41 | 120 |

**Suppose a student is randomly selected.**

   a. Find P(the student got a C)
   b. Find P(the student is in Finite Math)
   c. Find P(the student got an A OR the student is in the Statistics class)
   d. Find P(the student got a B AND the student is in the Math 105 class)
   e. Find P(the student got a C | the student is in the Finite Math class)
   f. Find P(the student is in the Finite Math class | the student got a C)
   g. Are the event that the student got a B and the event that the student is in Math 105 class mutually exclusive? How do you know? Use numbers to show this.
   h. Are the event that the student got a B and the event that the student is in Math 105 class independent? How do you know? Use numbers to show this.

2. Given that $P(E) = 0.2$, $P(K) = 0.6$, and $P(E \text{ and } K) = 0.15$, find $P(K | E)$.

3. If events R and S are mutually exclusive, find P(R and S)

4. If events R and S are independent and $P(R) = 0.4$ and $P(S) = 0.6$, find P(R and S)

5. From a deck with 5 Black and 4 Yellow cards, you first draw one card, and then another WITHOUT REPLACEMENT.

   a. Draw the tree diagram for this situation.
   b. Find the probability that you draw a Black card AND a Yellow card, in either order.
   c. Find the probability that you first draw a Yellow card and then draw a Black card.
   d. Find the probability that you draw a Black card, GIVEN that you drew a Yellow card on the first draw.
   e. Find the probability that you get a Black card on the second draw.

6. Two different Math 10 classes took a quiz on the same topics. In section A, the distribution was N(15, 0.8). In Section B, the distribution was N(16.5, 1.2) One student in section A received a 16 on his quiz. One student in section B received an 18 on her quiz. In comparison to their respective classes, who did better on the quiz?

7. Assume that in a certain community 30% of adults have a college degree. We randomly select 10 adults from this community. We are interested in how many have a college degree.

a) In words, define the random variable: $X =$
b) What values can the variable take on?
c) Give the distribution $X \sim$ _____
d) What is the probability that exactly 5 of the 10 adults have a college degree? Write a probability statement, the calculator command, and then calculate the probability.
e) What is the probability that at most 3 of the 10 adults will have a college degree? Write a probability statement, the calculator command, and then calculate the probability.
f) Find the probability that at least half of the 10 adults will have a college degree.


8. In 2000, as reported by the ACT Research Service, the mean ACT Math score was 20.7. Suppose the ACT Math scores are normally distributed with a standard deviation of 5. We are interested in the ACT math scores.

   a. Define the random variable in words. $X =$ _____
   b. What is the probability that a randomly selected student has an ACT Math score of at least 25?
   c. What is the probability that a randomly selected students has an ACT Math score less than 18?
   d. What is the probability that a randomly selected students has an ACT Math score between 24 and 27?
   e. Find the 95th percentile.


9. A cable TV company collected data on the number of emergency service calls it had to make in a given day. The results are shown in the table:

| # of calls | Probability |
| --- | --- |
| 0 | 0.10 |
| 1 | 0.20 |
| 2 | 0.25 |
| 3 | |
| 4 | 0.05 |
| 5 | 0.05 |

   a. Find P(X=3)
   b. Find P(X≥3)
   c. Find P(X>4)
   d. Find P(X≤3)
   e. Find the expected number of calls made per week.

10. When dieting, the amount of weight lost, in pounds, follows an unknown distribution with population mean equal to 12 pounds and standard deviation equal to 3 pounds. Suppose that a sample of 15 randomly chosen people is put on a special weight loss diet.
    a. $X =$
    b. $X\sim$
    c. $\overline{X} =$
    d. $\overline{X} \sim$
    e. Find the probability that the average weight lost by the 15 people is at most 14 pounds.
    f. Find the 90th percentile for the average amount of weight lost by 15 people.


### Exam 2 Review Answers

**1a. 31/120     b. 41/120     c. 57/120     d. 15/120     e. 11/41     f. 11/31**
 **g. No P(B and 105) $\neq$ 0     h. no , for example P(B) = 42/120 $\neq$ P(B| 105) = 15/39**
**2. .75          3. 0          4. .24**
**5b. (5/9)(4/8) + (4/9)(5/8)     c. (4/9)(5/8)   d. 5/8          e. (5/9)(4/8) + (4/9)(5/8)**
**6. they both score the same**
**7c. X~B(10, 0.30)     d. .1029     e. .6496     f. .1503**
**8. b. .1949    c. .2946          d. .1508          e. 28.92**
**9. a. .35     b. .45          c. .05          d. .90          e. 2.2**
**10. 1.b. X~unknown          d. $\overline{X} \sim N\left(12, \frac{3}{\sqrt{15}}\right)$     e. 0.9951     f. 12.99 pounds**