C Statistics | Name:
Final Exam Review Ch 5 & 6 | Date:

For problems 1 -3, let the sample space by S = {Chris, Adam, Elaine, Brian, Jason}. Suppose all outcomes are equally likely.

1. Compute the probability of the event E = {Adam}. $1/5$
2. Compute the probability of the event E = {Adam or Elaine}. $2/5$
3. Suppose that E = {Adam}. Compute the probability of the event E^c. $\frac{4}{5}$

4. Suppose that P(E) = 0.15, P(F) = 0.45 and P(F/E) = .70.
   a. What is P(E and F)? $= (.15)\cdot(.70) = .105$
   b. What is P(E or F)? $= .15 + .45 = .60 - .105 = .495$
   c. What is P(E/F)? $P(E/F) = \frac{P(E \text{ and } F)}{P(F)} = \frac{.105}{.45} = .233$
   d. Are E and F independent? No

5. Craps is a dice game in which two fair dice are cast. If the roller shoots a 7 or 11 on the first roll, he or she wins. If the roller shoots a 2, 3, or 12 on the first roll, he or she loses (or craps out).

7: 1 6 2, 2 5 2, 3 4 2
11: 5 6 2, 6 5

   a. Compute the probability that the shooter wins on the first roll. Interpret this probability. $8/36 = 2/9$

2: 1,1
3: 1,2; 2,1
12: 6 6

   b. Compute the probability that the shooter "craps out" on the first roll. Interpret this probability. $4/36 = 1/9$

Determine the value of each of the following.

6. 8! 40,320
7. ${}_{14}P_8$ 121,080,960
8. ${}_{12}C_6$ 924

9. During the 2007 season, the Boston Red Sox won 59.3% of their games. Assuming that the outcomes of the baseball game are independent and that the percentage of winds this season will be the same as in 2007, answer the following questions.

   a. What is the probability that the Red Sox win two games in a row?

   $(.593)(.593) = .352$

   b. What is the probability that the Red Sox will win seven games in a row?

   $(.593)^7 = .026$

   c. What is the probability that the Red Sox will lose at least one of the next 7 games?

   $1 - .026 = .974$

10. The US Senate Appropriations Committee has 29 members and a subcommittee is to formed selecting 5 of its members. How many different committees could be formed?

    ${}_{29}C_5 = 118755$

11. A student is taking a 40 question multiple choice test. Each question has five possible answers. If a student guesses at all possible answers calculate the following probabilities.

    a. What is the probability that the student correctly guesses 15 correct answers?

    ${}_{40}C_{15}\,(.20)^{15}(.80)^{25} = .005$

    b. What is the probability that the student guesses 29 or 30 incorrect answers?

    ${}_{40}C_{29}\,(.80)^{29}(.20)^{11} + {}_{40}C_{30}\,(.80)^{30}(.20)^{10} = .18$

    c. What is the probability that the student correctly guesses at least 15 correct answers?

    $P(x \geq 15) = P(x > 14.5)$ $\quad n = 40$ $\quad x = 15, 16, \ldots 40$

    d. What is the probability that the student correctly guesses at least 1 incorrect answer?

    $1 - P(\text{all correct})$

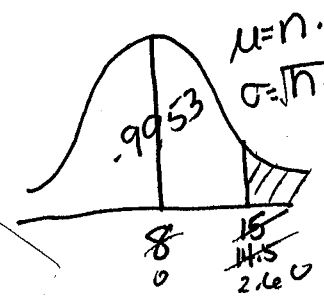
    $1 - (.20)^{40} = 1$ certain

$\mu = n \cdot p = 40(.20) = 8$

$\sigma = \sqrt{n \cdot p \cdot q} = \sqrt{40(.20)(.80)} = 2.5$

$Z = \dfrac{14.5 - 8}{2.5} = 2.60$

$1 - .9953 = .0047$



12. The following data represent the ages of boys belonging to a particular boy scout troop.

Age, x	Frequency
11	5
12	6
13	7
14	4
15	5
16	3
17	4

Age (x)	P(x)
11	5/34
12	6/34
13	7/34
14	4/34
15	5/34
16	3/34
17	4/34

a. Construct a discrete probability distribution.

b. Draw a probability histogram.

c. Compute and interpret the mean.

$\mu = \sum(x \cdot P(x)) = 11(5/34) + 12(6/34) + 13(7/34) + 14(4/34) + 15(5/34) + 16(3/34) + 17(4/34) = 13.7$

d. Compute and interpret the standard deviation.

$\sigma^2 = \sum(x^2 \cdot P(x)) - 13.7^2 = 190.735 - 13.7^2 = 3.045$

$\sigma = \sqrt{3.045} = 1.7$

e. What is the expected value of the age of a boy scout?

$E(x) = \sum(x \cdot P(x)) = \mu = 13.7$ yrs. old.

13. A life insurance company sells a $100,000 one year term policy to a 35 yr old male for $200. The probability that the male survives the year is 0.998725. Compute and interpret the expected value of this policy to the life insurance company.

	Gain	Loss
X	+200	−99,800
P(X)	.998725	1−.998725

$E(x) = \sum(x \cdot P(x)) = 200(.998725) - 99{,}800(.001275)$

$E(x) = \$72.50$