

Homework 3

73. Complete the PDF and answer the questions.

x	P(x)	x*P(x)
0	0.3	0
1	0.2	0.2
2	0.1	0.2
3	0.4	1.2

a. Find the probability that $x = 2$.

- $P(2) = 0.1$

b. Find the expected value.

- 1.6

75. A venture capitalist, willing to invest \$1,000,000, has three investments to choose from. The first investment, a software company, has a 10% chance of returning \$5,000,000 profit, a 30% chance of returning \$1,000,000 profit, and a 60% chance of losing the million dollars. The second company, a hardware company, has a 20% chance of returning \$3,000,000 profit, a 40% chance of returning \$1,000,000 profit, and a 40% chance of losing the million dollars. The third company, a biotech firm, has a 10% chance of returning \$6,000,000 profit, a 70% of no profit or loss, and a 20% chance of losing the million dollars.

a. Construct a PDF for each investment.

b. Find the expected value for each investment.

- Software = 1.2

- Hardware = 1.6

- Biotech = 1.3

c. Which is the safest investment? Why do you think so?

- The Biotech Company, since there is only a 20% chance of losing the investment money.

d. Which is the riskiest investment? Why do you think so?

- The Software company, since there is a 60% chance of losing the investment

e. Which investment has the highest expected return, on average?

- The Hardware Company

76. Suppose that 20,000 married adults in the United States were randomly surveyed as to the number of children they have. The results are compiled and are used as theoretical probabilities. Let X = the number of children married people have.

x	P(x)	$x \cdot P(x)$
0	0.1	0
1	0.2	0.2
2	0.3	0.6
3	0.2	0.6
4	0.1	0.4
5	0.05	0.25
6	0.05	0.3

- a. Find the probability that a married adult has three children.
- $p(3) = 0.2$
- b. In words, what does the expected value in this example represent?
- The average number of children married adults have.
- c. Find the expected value.
- 2.35
- d. Is it more likely that a married adult will have two to three children or four to six children?
How do you know?
- More likely two to three children, since $p(2) + p(3) = 0.5$, and $p(4) + p(5) + p(6) = 0.2$.

77. Suppose that the PDF for the number of years it takes to earn a Bachelor of Science (B.S.) degree is given as in Table 4.34.

x	P(x)
3	0.05
4	0.4
5	0.3
6	0.15
7	0.1

On average, how many years do you expect it to take for an individual to earn a B.S.?

- 4.85 Years

Use the following information to answer the next four exercises. Recently, a nurse commented that when a patient calls the medical advice line claiming to have the flu, the chance that he or she truly has the flu (and not just a nasty cold) is only about 4%. Of the next 25 patients calling in claiming to have the flu, we are interested in how many actually have the flu.

83. Define the random variable and list its possible values.

- The variable here is either has flu or does not have the flu. Possible values are 0, no flu, and 1, has flu.

84. State the distribution of X.

Binomial Distribution

85. Find the probability that at least four of the 25 patients actually have the flu.

- $p(4) = 0.013$

86. On average, for every 25 patients calling in, how many do you expect to have the flu?

- 1 Patient

Use the following information to answer the next two exercises: The probability that the San Jose Sharks will win any given game is 0.3694 based on a 13-year win history of 382 wins out of 1,034 games played (as of a certain date). An upcoming monthly schedule contains 12 games.

89. The expected number of wins for that upcoming month is:

a. 1.67

b. 12

c. 382/1043

d. 4.43

Let X = the number of games won in that upcoming month.

90. What is the probability that the San Jose Sharks win six games in that upcoming month?

a. 0.1476

b. 0.2336

c. 0.7664

d. 0.8903

91. What is the probability that the San Jose Sharks win at least five games in that upcoming month

a. 0.3694

b. 0.5266

c. 0.4734

d. 0.2305