



Problem 1¹

You draw a card from a deck. If you get a red card, you win nothing. If you get a spade, you win \$5. For any club, you win \$10 plus an additional \$20 for the ace of clubs.

1. Construct the probability distribution of the random variable for the amount you win.

X: amount you win

x	\$0 (red)	\$5 (spade)	\$10 (club)	\$20 (ace of clubs)
P(X=x)	26/52	13/52	12/52	1/52

2. Find the expected amount you will win if you draw a card

$$E(X) = \$0 (26/52) + \$5 (13/52) + \$10 (12/52) + \$20 (1/52) = \$3.94$$

3. About how much you expect to win if you play draw a card 20 times

$$20 E(X) = 20 (\$3.94) = \$78.8$$

Problem 2

Topics: discrete random variable, probability distribution, expected value

The probability distribution for the delay in hours of the evening flight from Chicago to New York is as follows:

x	1	2	3	4	5	6
P(X=x)	0.1	0.1	0.2	0.3	0.2	0.1

4. What is the probability that a randomly selected evening flight from Chicago to New York is delayed more than 3 hours?

- a) 0.3
- b) 0.1
- c) 0.6
- d) 0.7
- e) None of the above

5. If we take a sample of 100 evening flights from Chicago to New York, how many of them you would expect to have a delay of at least 4 hours?

- a) 10
- b) 20
- c) 30

¹ Open Intro Stat Book



- d) 60
- e) It cannot be calculated

Problem 3

Topics: discrete random variable, binomial distribution, estimates probability, expected value

In a certain country, the probability that a child dies during his or her first year of life is 0.014. We are interested in the expected number of infants who die before reaching their first birthdays in a random sample of 2,000.

6. In words, define the Random Variable X of interest.
 - a) The number of infants who dies in the first year of life.
 - b) The number of infants who dies during the first year of life in a random sample of 2,000.
 - c) The number of infants who are less that one year old.
 - d) The number of infants who survive their first year of life.
 - e) None of the above

7. How many infants are expected to die during their first year of life in a random sample of this size?
 - a) 32
 - b) 10
 - c) 40
 - d) 28
 - e) 0 (zero)

8. Which is the probability that there are none deaths during the first year?

$$X \sim \text{Bin}(n=2000, p= .014)$$

$$P(X=0) = \binom{2000}{0} (.014)^0 (1 - .014)^{2000}$$

9. Which is the probability that there is a maximum of two deaths during the first year?

$$P(X \leq 2) = P(X = 0) + P(X = 1) + P(X = 2)$$

$$= \binom{2000}{0} (.014)^0 (1 - .014)^{2000} + \binom{2000}{1} (.014)^1 (1 - .014)^{1999} + \binom{2000}{2} (.014)^2 (1 - .014)^{1998}$$



Problem 4

A popular fashion magazine has just recently published a poll saying that 45% of women who, if given the chance, would want to marry their first boyfriend. A random sample of 20 women from across the United States was taken. Answer the following questions.

1 This is clearly a binomial experiment. Which of the following is not a property of the Binomial?

- a) The observation for each woman is independent, since the women were randomly sampled.
- b) Each woman has the same probability they would like to marry their first boyfriend (45%).
- c) Each woman in the survey has based their response upon another woman's response.
- d) There is not enough information to answer this question.

2 What is the probability that half of the women sampled would like to marry their first boyfriend?

- a) 0.4500
- b) 0.1593
- c) 0.5513
- d) 0.6312
- e) Not enough information to answer this question.

3 Let's say we increased our sample to 100 women, what is the expected number of women in this new sample that would say that they would like to marry their first boyfriend?

- a) 45
- b) 55
- c) 65
- d) 75
- e) 35



Problem 5

Suppose X is a continuous random variable. If $P(X \geq 16) = 0.03$, then

10. $P(X < 16) = 1 - 0.03 = 0.97$

11. $P(X \leq 16) = P(X < 16) = 0.97$

12. $P(X > 16) = P(X \geq 16) = 0.03$

13. $P(X = 16) = 0$

