

Problems for Class 3

TRUE or FALSE problems

State whether you believe the given statement is TRUE or FALSE and provide a brief argument for your answer.

1. The probability that a person has an internet connection at home is 34%. The probability that they have access to the internet at work is 40%. The probability that a person who has access to the internet at work also has access at home is 55%. The probability that a person with an internet connection at home also has one at work is 73%.

2. Flipping a coin is an example of a random variable.

3. The random variable  $X$  has the following probability mass function:

$$f(X=1) = 0.55$$

$$f(X=2) = 0.55$$

$$f(X=3) = -0.10$$

$$f(X) = 0 \text{ otherwise.}$$

4. The random variable  $X$  has the following probability mass function:

$$f(X=1) = 1/3$$

$$f(X=2) = 1/3$$

$$f(X=3) = 1/3$$

$$f(X) = 0 \text{ otherwise.}$$

$$\text{Then } E(X) = 1/3$$

5. The random variable  $X$  has the following probability mass function:

$$f(X=1) = 1/3$$

$$f(X=2) = 1/3$$

$$f(X=3) = 1/3$$

$$f(X) = 0 \text{ otherwise.}$$

$$\text{Then } P(X \leq 2.5) = 8/9$$

Exercises

1. Show that

$$\sum_{i=1}^n (a + bx_i) = na + b \sum_{i=1}^n x_i$$

2. Expand the following expression:

$$\sum_{i=1}^n (a + bx_i + cy_i)^2$$

Exercises 3-10: NCT 4.85, 4.106, 4.113, 5.14, 5.19, 5.21, 5.23, 5.25.

11.  $X$  is a random variable the values of which are determined by the simultaneous throws of two fair dice according to the following rule:

$X =$  sum of the roll of each die.

Specify the pmf, cdf, expected value and variance of this r.v.

12.  $Y$  is a random variable the values of which are determined by the random draw of one card out of a deck of 52 cards according to the following rule:

$Y =$  denomination of the card, for cards 2, 3, 4, ..., 9, 10.

$Y = 1$  for aces.

$Y = 10$  for figure cards.

Specify the pmf, cdf, expected value and variance of this r.v.

13. (midterm 05-06)  $X$  is a random variable the values of which are determined by the simultaneous throws of two fair six-sided dice according to the following rule:

$X = X_1 \cdot X_2$ , where  $X_i$  is the roll of die  $i$ .

(a) Specify the pmf, cdf, expected value and variance of this r.v.

(b) Let  $Y = \sqrt{X}$ . Find the variance of  $Y$ .

(c) Find the probability that  $Y$  is less or equal to 4.25.