Homeworks

Basic concepts of random variables

Exercizes

– Ex. 1

Suppose that X is a random variable whose possible values are $\{1, 2, 3, 4, 5\}$. Consider the pmf $P(X = x) = (7 - x)/20$

1. calculate the expected value of X
2. calculate the variance of X
3. calculate the median and the interquartile range
4. plot the pmf
5. calculate $P(X \leq 4)$
6. calcualte the expectation of $g(X) = X^3 - 2$

– Ex. 2

Verify if the function $f(x) = 2(x - 1)^2$ for $1 \leq x \leq 2$ is a density.

– Ex. 3

Given the pdf $f(x) = 2 - 3x^2$ for $0 \leq x \leq 1$

1. calculate the expected value of X
2. calculate the cumulative distribution function
3. calculate $P(0.2 < X < 1)$

– Ex. 4

Suppose that X measures the length of time (in hours) needed to repair a computer, with pdf $f(x) = 1$ for $0 < x < 1$ and 0 otherwise

1. calculate the expected value of X

2. calculate the cumulative distribution function
3. consider that the cost per hour is $20 + 30X$ in dollars, determine the expected cost
4. calculate the median

– Ex. 5

Given the cumulative distribution function of a discrete variable

$$F(x) = \begin{cases} 0 & x < 0 \\ 0.02 & 0 \leq x < 2 \\ 0.12 & 2 \leq x < 5 \\ 0.37 & 5 \leq x < 10 \\ 0.77 & 10 \leq x < 12 \\ 1 & x \geq 12 \end{cases}$$

1. derive the probability mass function
2. calculate the median
3. calculate $E[X^2]$
4. calculate $P(2 \leq X \leq 5)$.