Problem Sheet 0

MA1202, Introductory Statistics

Due date - none

General information

Please prepare questions for Feedback Session on 21st January 2022 - you are expected to participate in discussion of these questions, your input will contribute to the participation mark.

Questions

Question 1.

For the following functions:

- determine whether each of them satisfies the conditions to be a p.m.f. (probability mass function) for a random variable X supported on the corresponding outcome space S;
- if the function is a p.m.f:
  - find the corresponding probability distribution function (cumulative distribution function);
  - find the first moment around the origin and the second centralized moment (i.e. the mean and the variance).

1. $$p(x) = \frac{x}{9},\ x \in S,\ S = 2, 3, 4$$
2. $$p(x) = \frac{5 - x}{10},\ x \in S,\ S = 1, 2, 3, 4$$
3. $$p(x) = \frac{x - 5}{10},\ x \in S,\ S = 5, 6, 7, 8, 9$$
4. $$p(x) = \frac{1}{5}(x + 1),\ x \in S,\ S = 0, 1, 2$$

Question 2.
A random variable X is described by the following continuous p.d.f.:

$$f(x) = \begin{cases} ce^{-x/20}, \text{ for } 0 \leq x < \infty \\ 0, \text{ otherwise.} \end{cases}$$

- determine a value of c so that $f(x)$ satisfies the properties of probability density functions;
- find the corresponding probability distribution function (cumulative distribution function);
- find the first moment around the origin and the second centralized moment (i.e. the mean and the variance).

Question 3.
A continuous random variable X is described by the following p.d.f.:

$$f(x) = \begin{cases} 2x, \text{ for } 0 < x < 1 \\ 0, \text{ otherwise.} \end{cases}$$

- find the corresponding probability distribution function (cumulative distribution function);
- find the first moment around the origin and the second centralized moment (i.e. the mean and the variance).