Sec #4

Birzeit University
Faculty of Engineering and Technology
Department of Electrical and Computer Engineering
Probability and Engineering Statistics – ENEE 2307
Quiz #2

13 November 2024 **Dr. Jaser Sa'ed** **Time: 10 min**

Student Name: **ID Number:**

Consider a random variable X whose probability mass function (PMF) is given as:

$$P(X=x)=\begin{cases} K \text{ if } x=-3 \\ 0.1 \text{ if } x=0 \\ 0.1 \text{ if } x=2.2 \\ 0.3 \text{ if } x=3 \\ 0.3 \text{ if } x=4 \\ 0 \text{ otherwise} \end{cases}$$

x_i	x_i^2	$P(X=x_i)$	$x_i P(X=x_i)$	$x_i^2 P(X=x_i)$
-3	9	0.2	-0.6	1.8
0	0	0.1	0	0
2.2	4.84	0.1	0.22	0.484
3	9	0.3	0.9	2.7
4	16	0.3	1.2	4.8
		Σ	1.72	9.784

a) Find the value of K.
b) Compute $P(2X-2 \geq 4)$.
c) Find Var(X).

a) $\sum_{-\infty}^{\infty} P(X=x)=1 \Rightarrow k+0.1+0.1+0.3+0.3+0=1$

$\boxed{k=0.2}$

b) $P(2X-2 \geq 4)=P(2X \geq 6)=P(X \geq 3)=P(X=3)+P(X=4)$

$=0.3+0.3$

$\boxed{=0.6}$

c) $Var(X)=\sigma_X^2=E[(X-\mu_X)^2]$ or

$\sigma_X^2=E[X^2]-\mu_X^2=9.784-(1.72)^2$

$\boxed{\sigma_X^2=6.8256}$

⊙ $\mu_X=\sum x_i P(X=x_i)=(-3)(0.2)+(0)(0.1)+(2.2)(0.1)+3(0.3)+4(0.3)$

$=1.72$

⊙ $\sigma_X^2=E[(X-1.72)^2]=\sum (x_i-1.72)^2 P(X=x_i)$

$=(-3-1.72)^2(0.2)+(0-1.72)^2(0.1)+(2.2-1.72)^2(0.1)+(3-1.72)^2(0.3)+(4-1.72)^2(0.3)$

$\boxed{\sigma_X^2=6.8256}$