AbdalRhman Gameel Ahmed Hebishy (G5)

Task2

- 4.34

  Calculate the Mean (Expected Value) of x :
  $\mu=\sum(x\cdot f(x))$
  $\mu=(-2\cdot 0.3)+(3\cdot 0.2)+(5\cdot 0.5)$
  $\mu=(-0.6)+(0.6)+(2.5)=2.5$

- Calculate the Variance of x:

$$\sigma 2=\sum[(x-\mu)2\cdot f(x)]$$

$$\sigma 2=[(-2-2.5)2\cdot 0.3]+[(3-2.5)2\cdot 0.2]+[(5-2.5)2\cdot 0.5]$$

$$\sigma 2=[(-4.5)2\cdot 0.3]+[(0.5)2\cdot 0.2]+[(2.5)2\cdot 0.5]$$

$$\sigma 2=(20.25\cdot 0.3)+(0.25\cdot 0.2)+(6.25\cdot 0.5)$$

$$\sigma 2=6.075+0.05+3.125=9.25$$

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then :$\sigma=(\sigma 2)$^0.5
$\sigma 2=9.25$ then : $\sigma\approx 3.04$

- Example 6 :

  Sorted data: 31, 35, 39, 39, 40, 43, 44, 44, 52
  The data has 9 values, so $n=9$.

  First Quantile (Q1): The 25th percentile.
- Position: $10025\times(n+1)=10025\times 10=2.5$
- **Third Quantile (Q3):** The 75th percentile.
- Position: $10075\times(n+1)=10075\times 10=7.5$
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- **First Quantile (Q1):**
- The 2nd value is 35.
- The 3rd value is 39.

$Q1=(35+39)/2=37$

Third Quantile (Q3):

The 7th value is 44.

The 8th value is 44.

$Q3=(44+44)/2=44$

- **Q1=37**
- Q3=44

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- 4.10 :

$E(X)=x\sum x\cdot P(X=x)$
$E(Y)=y\sum y\cdot P(Y=y)$

Calculate the Marginal Probabilities:

- For X:

- $P(X=1)=0.1+0.05+0.02=0.17$
  $P(X=2)=0.1+0.35+0.05=0.5$
  $P(X=3)=0.03+0.1+0.2=0.33$

For Y:

$P(Y=1)=0.1+0.1+0.03=0.23$
$P(Y=2)=0.05+0.35+0.1=0.5$
$P(Y=3)=0.02+0.05+0.2=0.27$

Calculate the Expected Values:

$E(X)={}_{x}\sum x\cdot P(X=x)$

$E(X)=1\cdot 0.17+2\cdot 0.5+3\cdot 0.33$

$E(X)=0.17+1+0.99=2.16$

$E(Y)={}_{y}\sum y\cdot P(Y=y)$

$E(Y)=1\cdot 0.23+2\cdot 0.5+3\cdot 0.27$

$E(Y)=0.23+1+0.81=2.04$

5.1:

$P(X=k)=(kn)pkqn-k$

$P(X=2)=(24)(43)2(41)4-2$

$(24)=2!(4-2)!4!=2\times 14\times 3=6$

Now, substitute into the formula:

$P(X=2)=6\times(43)2\times(41)2$

$P(X=2)=6\times(169)\times(161)=27/128$

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5.18:

Poisson Dis: $P(X=x)=(e^{-\lambda}*\lambda x)/x!$

The probability that 15 or fewer tankers arrive is:

$P(X\leq 15)=\sum e^{-\lambda}\lambda x/x!$ From x=0 to x=15

$P(X\leq 15)= \sum (e^{-10}*10^{x})/X!$ x=0 to x=15

$P(X>15)=1-P(X\leq 15)=1-0.9526=1-0.9526$

6.7:

Standardize the value:

The Z-score is calculated using the formula: $Z=(X-\mu)/\sigma$

$(x=2.3,\sigma=0.5,\mu=3)$

$Z=(2.3-3)/0.5=-1.4$

$P(Z<-1.4)$ is approximately 0.0808.

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