

For handout 1

BUAD 300

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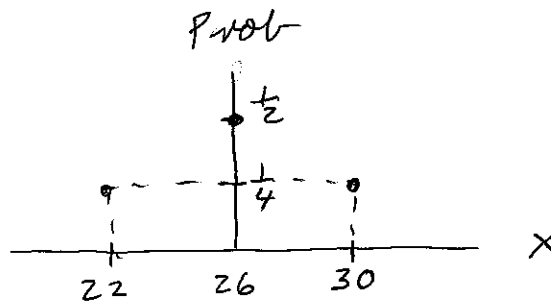
Some answers to Review Problems

Problem 2: Given the distribution below, find $E(X)$ and σ_X^2 ? Graph the distribution?

State i	X_i	Probability of i
1	22	$\frac{1}{4}$
2	26	$\frac{1}{2}$
3	30	$\frac{1}{4}$

$$E(X) = \sum_{i=1}^3 X_i P_i = 22\left(\frac{1}{4}\right) + 26\left(\frac{1}{2}\right) + 30\left(\frac{1}{4}\right) = 26$$

$$\begin{aligned}\sigma_X^2 &= \sum_{i=1}^3 (X_i - E(X))^2 P_i = (22 - 26)^2 \left(\frac{1}{4}\right) + (26 - 26)^2 \left(\frac{1}{2}\right) + (30 - 26)^2 \left(\frac{1}{4}\right) \\ &= 16\left(\frac{1}{4}\right) + 0\left(\frac{1}{2}\right) + 16\left(\frac{1}{4}\right) = 8\end{aligned}$$



3. Given the probability distribution below, what are $E(X)$, $E(Y)$, σ_X^2 , σ_Y^2 ? What is $\sigma_{X,Y}$?

State i	X_i	Y_i	Prob i
1	1	4	$\frac{1}{4}$
2	2	5	$\frac{1}{2}$
3	3	6	$\frac{1}{4}$

$$\underline{E(X) = \sum_i X_i P_i = 1\left(\frac{1}{4}\right) + 2\left(\frac{1}{2}\right) + 3\left(\frac{1}{4}\right) = 2}$$

$$\underline{E(Y) = \sum_i Y_i P_i = 4\left(\frac{1}{4}\right) + 5\left(\frac{1}{2}\right) + 6\left(\frac{1}{4}\right) = 5}$$

$$\begin{aligned}\underline{\sigma_X^2} &= \sum_i (X_i - E(X))^2 P_i = (1-2)^2\left(\frac{1}{4}\right) + (2-2)^2\left(\frac{1}{2}\right) + (3-2)^2\left(\frac{1}{4}\right) \\ &= 1\left(\frac{1}{4}\right) + 0\left(\frac{1}{2}\right) + 1\left(\frac{1}{4}\right) = \frac{1}{2}\end{aligned}$$

$$\begin{aligned}\underline{\sigma_Y^2} &= \sum_i (Y_i - E(Y))^2 P_i = (4-5)^2\left(\frac{1}{4}\right) + (5-5)^2\left(\frac{1}{2}\right) + (6-5)^2\left(\frac{1}{4}\right) \\ &= 1\left(\frac{1}{4}\right) + 0\left(\frac{1}{2}\right) + 1\left(\frac{1}{4}\right) = \frac{1}{2}\end{aligned}$$

$$\begin{aligned}\underline{\sigma_{X,Y}} &= \sum_i (X_i - E(X))(Y_i - E(Y)) P_i \\ &= (1-2)(4-5)\left(\frac{1}{4}\right) + (2-2)(5-5)\left(\frac{1}{2}\right) + (3-2)(6-5)\left(\frac{1}{4}\right) \\ &= 1\left(\frac{1}{4}\right) + 0\left(\frac{1}{2}\right) + 1\left(\frac{1}{4}\right) = \frac{1}{2}\end{aligned}$$