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Comma Eng Math sec 1
PSV

⑤ $P_{X,Y}(x,y) = \begin{cases} k|x-y| & , x=-4,-3,-2,\dots,4 \\ & ; y=-4,-3,-2,\dots,4 \\ 0 & , \text{otherwise} \end{cases}$

3.1) จาก Theorem : $\sum_{x\in S_X}\sum_{y\in S_y} P_{X,Y}(x,y) = 1$

abs $|x-y| = \begin{cases} x-y & ; x \geq y \\ -(x-y) & ; x < y \end{cases}$

จะได้ว่า $\sum_{x=-4}^{4}\sum_{y=-4}^{4} k|x-y| = 1$

$$k\Big[\{\underset{0}{(-4+4)}-(-4+3)-(-4+2)-(-4+1)-(-4-0)-(-4-1)-(-4-2)-(-4-3)-(-4-4)\}$$
$$+\{\underset{1}{(-3+4)}+\underset{0}{(-3+3)}-(-3+2)-(-3+1)-(-3-0)-(-3-1)-(-3-2)-(-3-3)-(-3-4)\}$$
$$+\{\underset{2}{(-2+4)}+\underset{1}{(-2+3)}+\underset{0}{(-2+2)}-(-2+1)-(-2-0)-(-2-1)-(-2-2)-(-2-3)-(-2-4)\}$$
$$+\{\underset{3}{(-1+4)}+\underset{2}{(-1+3)}+\underset{1}{(-1+2)}+\underset{0}{(-1+1)}-(-1-0)-(-1-1)-(-1-2)-(-1-3)-(-1-4)\}$$
$$+\{\underset{4}{(0+4)}+\underset{3}{(0+3)}+\underset{2}{(0+2)}+\underset{1}{(0+1)}+\underset{0}{(0+0)}-(0-1)-(0-2)-(0-3)-(0-4)\}$$
$$+\{\underset{5}{(1+4)}+\underset{4}{(1+3)}+\underset{3}{(1+2)}+\underset{2}{(1+1)}+\underset{1}{(1-0)}+\underset{0}{(1-1)}-(1-2)-(1-3)-(1-4)\}$$
$$+\{\underset{6}{(2+4)}+\underset{5}{(2+3)}+\underset{4}{(2+2)}+\underset{3}{(2+1)}+\underset{2}{(2-0)}+\underset{1}{(2-1)}+\underset{0}{(2-2)}-(2-3)-(2-4)\}$$
$$+\{\underset{7}{(3+4)}+\underset{6}{(3+3)}+\underset{5}{(3+2)}+\underset{4}{(3+1)}+\underset{3}{(3-0)}+\underset{2}{(3-1)}+\underset{1}{(3-2)}+\underset{0}{(3-3)}-(3-4)\}$$
$$+\{\underset{8}{(4+4)}+\underset{7}{(4+3)}+\underset{6}{(4+2)}+\underset{5}{(4+1)}+\underset{4}{(4-0)}+\underset{3}{(4-1)}+\underset{2}{(4-2)}+\underset{1}{(4-3)}+\underset{0}{(4-4)}\}$$

$= 1$

$$k[36+29+24+21+20+21+24+29+36] = 1$$

$$\therefore k = \frac{1}{240}$$

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Commu Eng Math sec. 1 PSU

3.2) Marginal PMF $P_X(x)$

จาก Definition : $P_X(x) = \sum_y P_{X,Y}(x,y)$

จะได้ $P_X(x) = \sum_{y=-4}^{4} k|x-y|$

$= \frac{1}{240} \sum_{y=-4}^{4} |x-y|$

$P_{X,Y}(x,-4) = \frac{1}{240}|x+4|$

$P_{X,Y}(x,-3) = \frac{1}{240}|x+3|$

$P_{X,Y}(x,-2) = \frac{1}{240}|x+2|$

$P_{X,Y}(x,-1) = \frac{1}{240}|x+1|$

$P_{X,Y}(x,0) = \frac{1}{240}|x|$

$P_{X,Y}(x,1) = \frac{1}{240}|x-1|$

$P_{X,Y}(x,2) = \frac{1}{240}|x-2|$

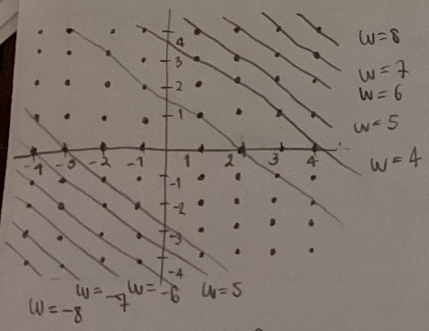
$P_{X,Y}(x,3) = \frac{1}{240}|x-3|$

$P_{X,Y}(x,4) = \frac{1}{240}|x-4|$

โดยที่ $x \in \{-4,-3,-2,\dots,4\}$

3.3) หา PMF $P_W(w)$ ของตัวแปรสุ่ม W โดยที่ $W = X+Y$

$$|x-y| = \begin{cases} x-y & ; x \geq y \\ -(x-y) & ; x < y \end{cases}$$



$P_W(w)$

$W = \{-8,-7,-6,\dots,8\}$