UCLA ID #:

~~Wr~~ ~~der~~ ~~wexas~~

You have 15 minutes for this quiz. Write your answers neatly in the spaces provided below or on the back of the sheet. Make sure to include a thorough explanation of your solution – simply writing an answer with no justification will not be awarded points.

6 sided die fair

1. Suppose you roll two dice, and call their outcomes D_1 and D_2. Find the expected value of their sum, $D_1 + D_2$, given that the difference $D_1 - D_2$ is 1. That is, find $E(D_1 + D_2 | D_1 - D_2 = 1)$.

$E[D_1 + D_2 \mid D_1 - D_2 = 1]$

$D_2 \backslash D_1$	1	2	3	4	5	6
1	0	$\boxed{1}$	2	3	4	5
2	-1	0	$\boxed{1}$	2	3	4
3	-2	-1	0	$\boxed{1}$	2	3
4	-3	-2	-1	0	$\boxed{1}$	2
5	-4	-3	-2	-1	0	$\boxed{1}$
6	-5	-4	-3	-2	-1	0

$D_1 -$

$(d_1+D_2)\,p(d_1,d_2) = \frac{1}{5}\cdot 3 + \frac{1}{5}\cdot 5 + \frac{1}{5}\cdot 7 + \frac{1}{5}\cdot 9 + \frac{1}{5}\cdot 11$

$= \frac{1}{5}(3+5+7+9+11)$

$= \boxed{\frac{42}{5}}$

$$\begin{array}{r} \overset{1}{27} \\ 15 \\ \hline 42 \end{array}$$

5

$D_2 \backslash D_1$	1	2	3	4	5	6
1		3				
2			5			
3				7		
4					9	
5						11
6						

$D_1 + D$

restricted Ω

2. Prove that for two independent random variables X and Y,

$$\mathrm{Var}(XY) = \mathbb{E}[X^2]\mathbb{E}[Y^2] - (E[X])^2(E[Y])^2.$$

$E[XY] = E[X]\,E[$

$\mathrm{var}(XY) = \sum_y \sum_x (XY - E(XY))^2\, p_X(x,y)$

$= \sum_y \sum_x (X^2Y^2 - 2XY\,E[XY] + (E[XY])^2)\, p_{XY}(x,y)$ and $p_X(x,y$

$= \sum_x x^2 p_X(x) \sum_y y^2 p_Y(y) - 2E[XY] \sum_y\sum_x XY\, p_{XY}(x,y) - E[XY]^2 \sum_y$

$= E[X^2]E[Y^2] - 2E[XY]E[XY] + (E[XY])^2 \cdot$

$= E[X^2]E[Y^2] - 2(E[XY])^2 + (E[XY])^2$

$= E[X^2]E[Y^2] - (E[XY])^2$ and E

$= E[X^2]E[Y^2] - (E[X]E[Y])^2$

$= E[X^2]E[Y^2] - (E[X])^2 (E[$

$\therefore \mathrm{Var}(XY) = E[X^2]E[Y^2] - (E(X))^2(E(Y))^2$

Scanned by CamScanner