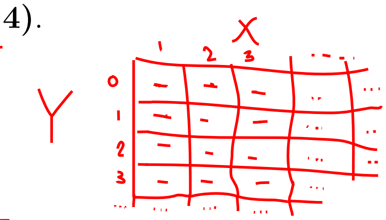
Show all work. A correct answer with no solution will give only a partial credit.
Write each problem on a separate page. Each answer should be clearly written in the end of the page.
Preferably, make a single pdf file and submit in HuskyCT.

(1a) Let $\boldsymbol{X}$ be a Geometric random variable with $\boldsymbol{p = 1/3}$ and $\boldsymbol{Y}$ be a Poisson random variable with $\boldsymbol{\lambda = 2}$. Assuming that $\boldsymbol{X}$ and $\boldsymbol{Y}$ are independent, find $\mathbb{P}(\boldsymbol{X+Y \geqslant 4})$.



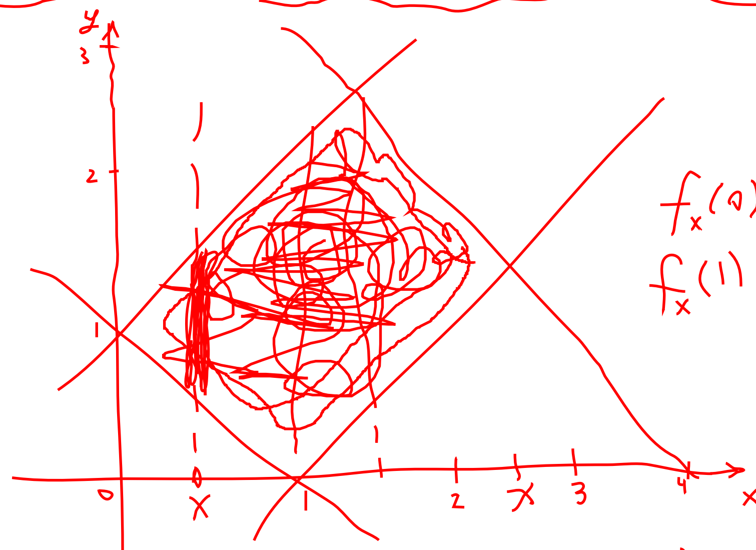
(1b) In the same situation find $\mathbf{Cov}(\boldsymbol{X+Y, XY})$. $\neq 0$

EX^2, EY^2 ? $E(X+Y)XY = ?$

(2a) Let $\boldsymbol{X, Y}$ be uniformly distributed in the rectangle defined by $\boldsymbol{-1 < x-y < 1}$, $\boldsymbol{1 < x+y < 4}$. Find the marginal density $\boldsymbol{f_X(x)}$. $= \frac{L}{A}$

(2b) In the same situation find $\mathbb{E}(\boldsymbol{Y|X})$.

(2c) In the same situation find $\mathbf{Cov}(\boldsymbol{X,Y})$.



$f_X(0) = 0$

$f_X(1) = \frac{2}{A}$

End of the test $f(x,y) = \frac{1}{A}$

$\underbrace{EXY} - \underbrace{\underbrace{EX}_{2B} \cdot \underbrace{EY}_{2b}}_{}$

pic $\Leftrightarrow$ (EX, EY) = center of mass

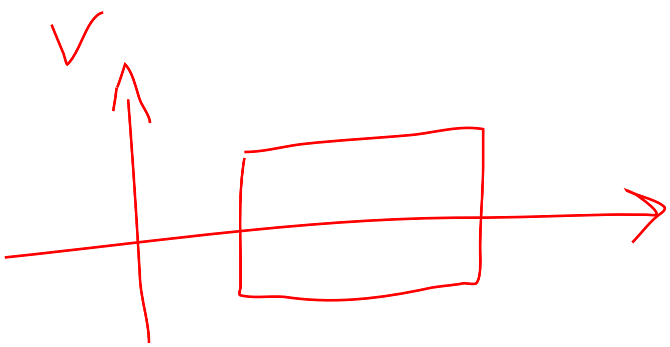
$E(Y|X=0) = 1$

$E(Y|X=1) = 1$

* (1) cases

* (2) change of var. $1 < U = X+Y < 4$

$-1 < V = X-Y < 1$



$2X = U+V$

$2Y = U-V$

$XY =$