FINISH BEFORE YOU COME TO THE REVIEW SESSION.

(2) E[X+Y]=E[X]+E[Y], (use definition) (3)E[X+Y|Z]=E[X|Z]+E[Y|Z], (use definition)

1. Prove (1) $\mathbb{E}[aX+b] = a\mathbb{E}[X]+b$, (by definition)

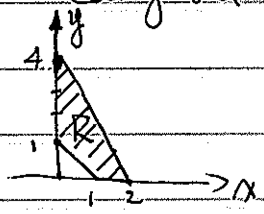
(5) $\mathbb{E}[XY] = \mathbb{E}[Y\mathbb{E}[X|Y]]$, (~~condition~~ chain rule)

(4) $\mathbb{E}[X|X] = X$, (trick)

(6) E[X|Y]=E[X] if X is independent of Y, (use definition)

(7) E[XY]=E[X]E[Y] if and only if X,Y are uncorrelated.

2. Carry out the integration over R:



$$\iint_R \left(\tfrac{1}{2}x+y\right)dx\,dy$$

3.

Y \ X	-1	1	0
1	1/20	1/20	1/20
2	2/20	1/20	8/20
8	4/20	1/20	1/20

Give the joint pmf of X, Y, calculate

i) conditional pmf $p_{Y|X}(y|1)$

ii) conditional pmf $p_{X|Y}(x|8)$

iii) values of $p_{Y|X}(1|x)$, for $x=-1,0,1$.

iv) values of $p_{X|Y}(0|y)$, for $y=1,2,8$.

v) does conditional pmf sum to 1? Why?

4. Calculate $\sum_{n=0}^{\infty} p^n$

p belongs to (0,1)

$\sum_{n=0}^{\infty} np^n$

$\sum_{n=0}^{\infty} n^2p^n$