

Name \_\_\_\_\_

Student Number \_\_\_\_\_

**STA107H5S Quiz 4A**Consider the random variable  $x$  and  $y$  with joint probability mass function:

X/Y	-1	0	1	2
0	0.05	0.15	0.1	0.2
1	0.15	0.1	0	0.25

1. (2 marks) Find  $P(X=2 \mid Y=1)$  and  $P(Y=0 \mid Y=0)$ . Note the rows in the pdf are the values of  $X$  and the columns the values of  $Y$ .

$$P(X=2 \mid Y=1) = 0 \cdot 0.1 / 0.1 = 0, P(Y=0 \mid Y=0) = 0.25 / 0.25 = 1$$

2. (2 marks) Find the Distribution of  $XY$

$XY$	-1	0	2
$P(XY)$	0.15	0.6	0.25

3. (3 marks) Consider a different unspecified joint density function for random variables  $X$  and  $Y$ . If  $P(X=1 \mid Y=2) = P(Y=2 \mid X=1)$  and  $P(X=1) = 0.2$ . Find  $P(Y=2)$

$$P(Y=2) = 0.2$$

4. (3 marks) consider the random variable  $X$  with  $E(X) = \mu$  and  $\text{Var}(x) = \sigma^2$ . Express  $E[(2X-2)(X+2)]$  in terms of  $\mu$  and  $\sigma^2$

$$E[(2X-2)(X+2)] = E[2X^2+4X-2X-4]=2\sigma^2+4\mu-4$$