

Name \_\_\_\_\_

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

## STA256H5F Quiz 4B

An experiment consists of flipping 2 coins observing the side of the coin. Let  $\mathcal{S} = \{HH, HT, TH, TT\}$ , Define the random variable X such that:

$$X = \begin{cases} 0 & \text{if the first coin toss is head} \\ 1 & \text{otherwise} \end{cases}$$

1. (2 marks) State the PDF of X and find  $E(X)$  and  $\text{Var}(X)$ .

$$P(X=0) = P(X=1) = 1/2$$

2. (2 marks) Define Y using the same  $\mathcal{S}$ . State the PDF of Y and find  $E(Y)$  and  $\text{var}(Y)$ .

$$Y = \begin{cases} 0 & \text{if the second coin is heads} \\ 1 & \text{otherwise} \end{cases}$$

same as Q1

3. (2 marks) Find  $P((X=0) \cap (Y=0))$  Which sample point(s) are in the set  $(X=0) \cap (Y=0)$ ?

$$1/4$$

4. (4 marks) Let  $X \sim \text{Bin}(n=10, p=0.6)$  and  $Y \sim \text{Bin}(n=12, p=0.6)$  find  $P(X+Y=4)$ .

$X+Y \sim \text{Bin}(n=22, p=0.6)$