

Name _____

Student Number _____

STA256H5F Quiz 6

Let $X \sim \text{Bernoulli}$ with

$$X = \begin{cases} 0 & \text{with probability} = 1 - p \\ 1 & \text{with probability} = p \end{cases}$$

Note: $p(x) = xp + (1-x)(1-p)$

1. (4 marks) Use the moment generating function to find $E(X)$, the first moment of X .

$$\frac{d}{dt} MGF_X(t) \Big|_{t=0} = \sum_0^1 P(X)X = p$$

2. (3 marks) Show that the second centred moment of a random variable X is equal to the variance of X . You do not have to solve for it, just show that it is $\sum_0^1 P(X)(X - \mu_X)^2$, where μ_X is the first moment of X .

$$\text{Trivial, just evaluate } \frac{d^2}{dt^2} MGF_{X-p}(t) \Big|_{t=0}$$

3. (3 marks) *True or False:* The first centred moment of any distribution is 0. Explain your answer.

$$\text{True, since the first centred moment of } X \text{ is } E(X - E(X)) = E(X) - E(X) = 0$$

Good Luck!