Theory online test 7 instructions

NOTE: Work through **Homework 8 and 9 and the Chapter 4(A) & 4(B) class notes** before you attempt the online test.
IMPORTANT: Work with all the decimal places throughout all your calculations and only round off your **final answer to the required decimal places.**.

Example 1 *As part of a fund-raising campaign, a school sells* 2000 *raffle tickets at a price of* $R700$ *per ticket. One person will win a prize worth* $R700\ 000$ *which includes an all expenses paid trip to go to the 2019 US Masters Open in Augusta. Let*

$$X = \textit{winnings per ticket}$$

Determine the probability distribution of X **before you start with the online test**.

Example 2 *A manufacturer has one hundred memory chips in stock of which* 7% *are defective (based on past experience). A random sample of* 5 *memory chips is selected and shipped to a factory that assembles laptops. Let*

$$X = \textit{the number of computers that receive faulty memory chips.}$$

Given: $E(X) = 0.35$ *and* $Std(X) = 0.5589$.

Determine the probability distribution of X **before you start with the online test**.

Example 3 *Let*

$$X = \textit{number of students who are members of party ABC}$$

Given: *The moment-generating function of* X *is given by*

$$M_X(t) = \left[\frac{1}{4} + \frac{3}{4}e^t\right]^{25}$$

Use the moment-generating function of X *to calculate the expected value and variance of* X **before you start with the online test**.

Example 4 *Consider the following probability density function (pdf) of* Y :

$$f(y) = \begin{cases} 3(1-y)^2 & 0 \leq y \leq 1 \\ 0 & \textit{elsewhere} \end{cases}$$

Calculate the expected value and variance of Y **before you start with the online test**.

Example 5 *A supermarket has two express lines. Let* X *and* Y *denote the number of customers in the first and second line respectively at any given time. During non-rush hours the joint probability distribution of* X *and* Y *is summarised by the following table:*

		y			
$f(x,y)$		0	1	2	3
	0	0.1	0.2	0	0
x	1	0.2	0.25	0.05	0
	2	0	0.05	0.05	0.025
	3	0	0	0.025	0.05

Do the following before you start the online test:

i). Determine the marginal probability distributions of X *and* Y *respectively, i.e.* $g(x)$ *and* $h(y)$

ii). Determine the expected values and variances of X *and* Y.

iii). Determine the covariance between X *and* Y.

Example 6 *Suppose* X *and* Y *are continuous random variables with joint probability density function*

$$f(x,y) = \begin{cases} \frac{2}{3}(x+2y) & 0 < x < 1, 0 < y < 1 \\ 0 & \textit{elsewhere} \end{cases}$$

Determine the marginal densities of X *and* Y *and* $E(XY)$ **before you start the online test.**