STA237H1F Midterm – Fall 2023 (Oct 27, 2023)

Statistical Sciences
UNIVERSITY OF TORONTO

1. The probability mass function, $p_X(x)$, for a discrete variable X is given in the following table.

x	-1	0	1
$p_X(x)$	1/2	1/4	1/4

Let $Y = X^2$.

(a) Write down the probability mass function of Y. Show your steps. (Hint: first list all the values Y can take on, and then compute the corresponding probability mass function values using the information about X).

(b) Write down the moment generating function of Y. Show your steps.

(c) Compute the mean and variance of Y. Show your steps.

2. It is estimated that **45%** of all emails are spam (i.e., junk email). Many of these are marked by spam filters and sent directly to junk mail folders. Some are not. Suppose you are exploring characteristics of messages

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