STA238 Summer 2026 Midterm Solution

Duration: 1 hour 50 minutes | **Total: 30 points**

Problem 1. The overnight shift at a downtown Toronto emergency room records the number of patients arriving during each one-hour window. Over several weeks, the counts $x_1, x_2, \ldots, x_{80}$ for $n = 80$ windows were recorded, summarized in the frequency table below:

Arrivals in an hour	0	1	2	3	4	5	6	7
Number of hours	5	17	22	17	11	5	2	1

(a) (1 pt) A colleague proposes modelling the hourly arrival counts with a Normal distribution. Briefly explain why this is not an appropriate model, and propose a more suitable family of distributions.

Solution. The counts are non-negative integers, while a Normal random variable is continuous and places probability on negative and non-integer values (0.5 pt). A more suitable