Stat 107 – Homework 2

Due back during class on Monday, December 1

Problem 1 [10 points]

The number of cars entering a parking lot is a Poisson process of rate 4 per hour. The lot has room for 12 cars.

a) Find the probability that the lot will fill up in the first hour.

b) Find the probability that fewer than 12 cars will arrive in an eight-hour day.

Problem 2 [10 points] An oil exploration firm has scheduled to drill 10 wells. Each of the wells, independently, has probability 0.1 to strike recoverable oil. It costs the firm CAD 10,000 to drill each well and a successful well will bring in oil worth of CAD 150,000.

a) What is the firm's expected gain from the ten wells?

b) Find the variance of the firm's gain?

Problem 3 [10 points] The pH of water samples from a specific lake is a random variable X with probability density function

$$f(x) = \begin{cases} C(7-x)^2 & if \ 5 \le x \le 7 \\ 0 & otherwise \end{cases}$$

a) [3 points] Find the constant C such that f is a probability density.

b) [5 points] Find $E[X]$ and $Var[X]$.

c) [2 points] Find $P(X \ge 5.2)$.