Stat 230

June 17 Demo/ Practice problems

All the problems are ungraded. These are demo problems for the central limit theorem, so these are done by me with the computer. That being said, you may find problem 1 good practice for conditional expectations.

Pr. 1 Suppose customers arrive at a gas station according to a Poisson process at a rate of 900 arrivals per day, and make purchases at the station independently of one another. The distribution of the money spent (in dollars) by a single customer has a pdf

$$f(y) = \begin{cases} \frac{1}{30}, & \text{for } y \in (0, 10) \\ \frac{1}{60}, & \text{for } y \in (30, 70) \\ 0, & \text{otherwise} \end{cases}$$

Customers who spend more than \$10 at the store are termed premier customers.

a) What is the expected amount a randomly chosen customer spends? What is the expected amount a randomly chosen premium customer spends?

b) What is the expected total sales the station makes a day?

c) What is the expected total sales the station makes a day coming from premium customers?

Pr. 2 How good is the stirling approximation?

$$x! \approx \sqrt{2\pi n}\left(\frac{n}{e}\right)^n?$$