Math 477, Worksheet for lecture 14

Name: _____

Net ID: _____

1. In a certain forest, there is a population of mice and cats. Almost every mouse will eventually be eaten by a cat. Suppose that the likelihood of a mouse being eaten is the same at every point in time, and that a mouse has a 30% chance of being eaten in any given month.
   (a) What is the likelihood a family of 4 mice all being eaten in a given month?

   (b) What is the probability that a given mouse survives for at least 2 1/2 months?

2. Suppose we have a continuous random variable X, and let $Y = X^2 + 2$. Are X and Y jointly continuous?

3. Suppose that X and Y are jointly continuous random variables with joint density function given by

$$f(x,y) = \begin{cases} 2e^{-x-2y} & x, y > 0 \\ 0 & \text{otherwise} \end{cases}$$

   (a) Find the probability density functions for X and Y individually.

   (b) Find the probability density function for $X + Y$ (hint: find the cumulative distribution function first).

   (c) Find the probability density function for X/Y.

   (d) Are X and Y independent?