Integration Problems

1. Oil is leaking form a tanker at a rate of $R(t) = 2000e^{-0.2t}$ gallons/hour, where t is measured in hours. To the nearest gallon, how much oil has leaked out of the tanker after 10 hours?

2. Suppose the density of cars/mile for the first 30 miles along the Mass Pike from Boston during certain hours of the day can be modeled by $p(x) = 100\left(2 - \sqrt[3]{0.1x + 0.2}\right)$ where x represents the number of miles from Boston.
   a) Write a function that gives the number of cars from Boston to a point x miles from Boston.

   b) To the nearest car, how many cars are there on this 30 mile stretch of road?

3. Suppose the density of a circular oil slick on the surface of a body of water is given by:
$p(r) = \frac{100}{1+r^2}\ km/m^2$, (r is the distance from the center of the slick).

   a) Suppose the slick extends from r = 0 to r = 1000 m. Determine the mass of the oil slick to the nearest kg.

   b) What is the smallest radius that contains 75% of the oil slick's mass?