Population Models- HW Problems

In problems 1 and 2 solve the logistic differential equation (without using the general formula).

1. $\dfrac{dx}{dt} = x(5 - x);$ $\quad x(0) = 3$

2. $\dfrac{dx}{dt} = 20x - x^2;$ $\quad x(0) = 2$

3. Suppose a population of mice, $P(t)$, has a birth rate of zero and a death rate proportional to $\dfrac{1}{\sqrt[3]{P}}$ (in deaths per month). If at time $t = 0$ the population of mice is 1000 and the population is 216 after 3 months, when will the population equal 0?

4. A population of squirrels, $P(t)$, sastisfies the logistic equation $\dfrac{dP}{dt} = aP - bP^2$. Suppose that at time $t = 0$ the population is 120, there are 4 births per month and 3 deaths per month. How many months does it take for the population to reach 95% of the limiting population?