7. [13 points] A company designs an air filter for a ship's engine room that reduces the amount of fumes in the air by k percent every hour. The machinery in the engine room produces fumes at a rate of 0.02 kilograms per hour. Let $Q(t)$ be the amount in kilograms of fumes in the room t hours after the engines are activated. Hence Q satisfies

$$\frac{dQ}{dt} = 0.02 - \frac{k}{100}Q.$$

a. [9 points] Find a formula for $Q(t)$. Suppose there are no fumes in the air when the engines are activated.

b. [2 points] What is the value of $Q(t)$ in the long run?

c. [2 points] Air safety regulations require that the *concentration* of fumes in the air not exceed 10^{-4} kilograms per liter at any time. If the volume of air in the engine room is 10^3 liters, for what values of k are the safety regulations met at all times?