11. [12 points] Quinn is a patient taking a new experimental medicine.
   a. [4 points] Quinn knows that the amount of the medicine in her body decays at a rate proportional to the current amount of the medicine in her body with constant of proportionality $k > 0$. Let $Q = Q(t)$ be the quantity, in mg, of this medicine that is in Quinn’s body $t$ days after she begins taking it. Assuming the medicine enters her body at a continuous rate of 200mg per day, write a differential equation that models $Q(t)$, and give an appropriate initial condition.

   Answer: Differential Equation: 
   Initial Condition: 

For parts b.-d. below, suppose that the medicine has a half-life of 12 hours in her body and that, rather than entering her body continuously throughout the day, Quinn takes one 200mg pill each morning at 8am.
Let $Q_n$ be the quantity, in mg, of this medicine that is in Quinn’s body immediately after she takes the $n$th pill. For example, $Q_1$ is the amount of medicine in her body immediately after she takes her first dose.
   b. [2 points] Find the values of $Q_1$, $Q_2$ and $Q_3$.

   Answers: $Q_1 = \underline{\phantom{000}}$ $Q_2 = \underline{\phantom{000}}$ $Q_3 = \underline{\phantom{000}}$

   c. [4 points] Write a closed form expression for $Q_n$. (Your answer should not include sigma notation or ellipses (⋯).)

   Answer: $Q_n = \underline{\phantom{000}}$

   d. [2 points] What is $\lim_{n \to \infty} Q_n$? Interpret your answer in the context of the problem.