Quiz 2 Solutions

Name: _____

You will have 20 minutes ∘ Calculators are allowed ∘ Show all work for credit ∘ Don't cheat ∘ attempts at a problem may count for partial credit.

1. The volume of a cell increases at a rate of 10 μm^3 per hour.

   (a) [2 pts] Express this statement as a differential equation.

   $$\frac{dV}{dt} = 10$$

   (b) [2 pts] Find the solution to this equation assuming the volume of the cell was initially 500μm^3.

   $V(t) = 10t + 500.$

2. [4 pts] Find the solution to the following differential equation:

   $$\frac{dy}{dt} = 2 + e^{-t}, \qquad y(0) = 1.$$

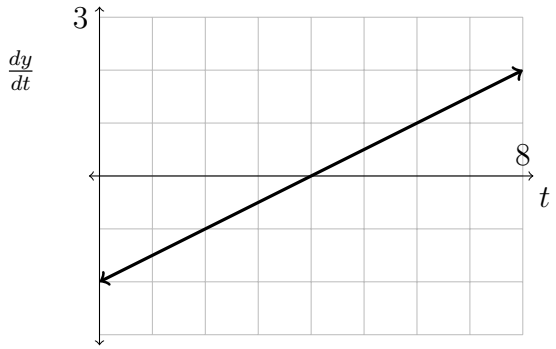
   $y(t) = 2t - e^{-t} + 2.$

3. [3 pts] Suppose that $f(x) = 2x^2 + 7$.

   (a) What differential equation does $f(x)$ solve? $f'(x) = 4x$ is the differential equation.

(b) What is the initial condition? $f(0) = 7$.

4. Below is the graph of $\frac{dy}{dt}$ as a function of time.



(a) [1 pts] On which interval(s) is $y(t)$ increasing? $[4, 8]$

(b) [1 pts] On which interval(s) is $y(t)$ decreasing? $[0, 4]$

(c) [2 pts] Sketch a graph of $y(t)$ assuming an initial condition of $y(0) = 0$.