AP Calculus Homework 19

Please write your answer on a separate piece of paper and submit it on Classkick or write your answer directly on Classkick.

Please write all answers in exact forms. For example, write π instead of 3.14.

Questions with a * are optional. Questions with ** are optional and more challenging.

1. Sketch a direction field for the differential equation. Then use it to sketch two solution curves.

a) $y' = 1 + y$ b) $y' = x^2 - y^2$

2. Use Euler's method with step size 0.5 to compute the approximate y-values y_1, y_2, y_3, and y_4 of the solution of the initial-value problem $y' = y - 2x$, $y(1) = 0$.

3. Use Euler's method with step size 0.2 to estimate $y(1)$, where $y(x)$ is the solution of the initial-value problem $y' = 1 - xy$, $y(0) = 0$.

4. Use Euler's method with step size 0.1 to estimate $y(0.5)$, where $y(x)$ is the solution of the initial-value problem $y' = y + xy$, $y(0) = 1$.

5. If $\dfrac{dy}{dt} = -2y$ and if $y = 1$ when $t = 0$, what is the value of t for which $y = \dfrac{1}{2}$.

(A) $-\dfrac{\ln 2}{2}$ (B) $-\dfrac{1}{4}$ (C) $\dfrac{\ln 2}{2}$ (D) $\dfrac{\sqrt{2}}{2}$ (E) $\ln 2$

6. If $\dfrac{dy}{dt} = ky$ and k is a nonzero constant, then y could be

(A) $2e^{kty}$ (B) $2e^{kt}$ (C) $e^{kt} + 3$ (D) $kty + 5$ (E) $\dfrac{1}{2}$

7. Population y grows according to the equation $\dfrac{dy}{dt} = ky$, where k is a constant and t is measured in years. If the population doubles every 10 years, then the value of k is

(A) 0.069 (B) 0.200 (C) 0.301 (D) 3.322 (E) 5.000