AP Calculus BC Quiz 1b

- 1. (Inspired by 2007 form B, #5, which used steps of $\frac{1}{2}$ on a No Calculator question-feel free to use a calculator today) Consider the differential equation $\frac{dy}{dx} = 4x y + 1$
 - (a) (2 points) Find $\frac{d^2y}{dx^2}$ in terms of x and y

(b) (2 points) Let y = f(x) be a particular solution to the differential equation with the initial condition f(0) = -2. Use Euler's method, starting at x = 0 with a step size of 0.25, to approximate f(1). Show the work that leads to your answer.

(c) (1 point) Explain why you think part (b) is either an underestimate or an overestimate.

(d) (2 points) Let y = g(x) be another solution to the differential equation $\frac{dy}{dx} = 4x - y + 1$ with the initial condition g(0) = k, where k is a constant. Euler's method, starting at x = 0 with a step size of 1, gives the approximation $g(1) \approx 0$. Find the value of k.