Math 31L Quiz #2 (Lab 4, part 1)

Blake, Fall 1996

Name_____

1. (6 points) In applying Euler's method we use the formula $y_k = y_{k-1} + slope_{k-1}\,\Delta t$.

   (a) [Multiple Choice] The term, $slope_{k-1}\,\Delta t$, measures...
   - (i) the running slope of the curve.
   - (ii) the y-value at step k.
   - (iii) the y-value at step $k-1$.
   - (iv) the vertical rise from step $k-1$ to step k.
   - (v) the horizontal change from step $k-1$ to step k.

   (b) In part (a) you picked the description of what the expression, $slope_{k-1}\,\Delta t$, measures. Show mathematically why your answer to (a) must be true.

2. (8 points) Assume that $\frac{dy}{dt} = y^2 + y$ and $y_0 = y(0) = 3$. Suppose that we use Euler's method with $\Delta t = \frac{1}{2}$ to approximate the graph of $y(t)$. Compute the coordinattes of the approximating points (t_1, y_1) and (t_2, y_2). Be sure to show all your work.

Answers: $(t_1, y_1) = (\quad , \quad)$

$(t_2, y_2) = (\quad , \quad)$

3. (6 points) The diagram on the right shows the graph of $y = f(t)$. Suppose that instead of having the graph, we knew the starting point, $(t_0, y_0) = (2,1)$, and the value of $\frac{dy}{dt}$ at any point. Show on the diagram the points (t_1, y_1) and (t_2, y_2) that Euler's method would produce. **Leave some evidence as to why you chose the points that you indicate.**