MA 266 Fall 00 HW 3 Handout Name _____

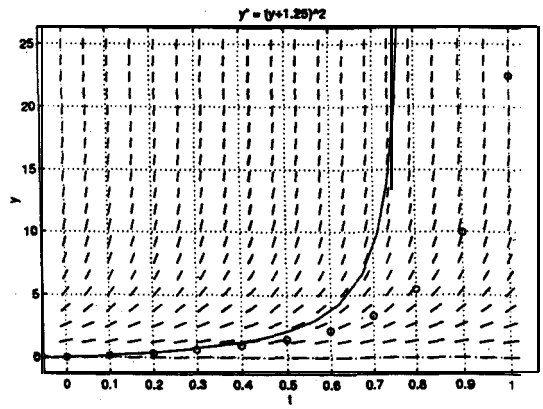
1. Find the solution of the initial value problem y' = $2y - 1$, $y(0) = 1$.
$\phi(t) =$ _____

Find the approximate value of the solution of the initial value problem
y' = 2y − 1, $y(0) = 1$, where $t = 0.4$ using:
the Euler method (eul) with $h = 0.1$ _____
the Euler method (eul) with $h = 0.05$ _____
the Euler method (eul) with $h = 0.025$ _____
the improved Euler method (rk2) with $h = 0.1$ _____
the Runge-Kutta method (rk4) with $h = 0.1$ _____
the solution $\phi(t)$ _____

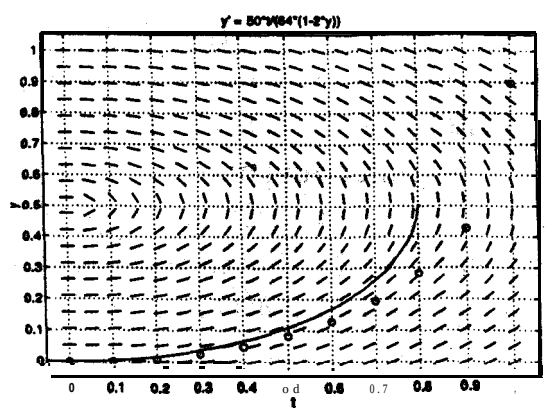
2. Find 'the approximate value of the solution of the initial value problem
y' = $\sqrt{t+y}$, $y(1) = 3$, where $t = 2$ using :
the Euler method (eul) with h = 0.025 _____
the Euler method (eul) with h = 0.0125 _____
the improved Euler method (rk2) with h = 0.1 _____
the improved Euler method (rk2) with h = 0.05 _____
the Runge-Kutta method (rk4) with h = 0.2 _____
the Runge-Kutta method (rk4) with h = 0.1 _____

3. Give reasons why the Euler: tangent line method with $h = 0.1$ does not give a good approximation of the value of the solution of the initial value problem where $t = 1$.

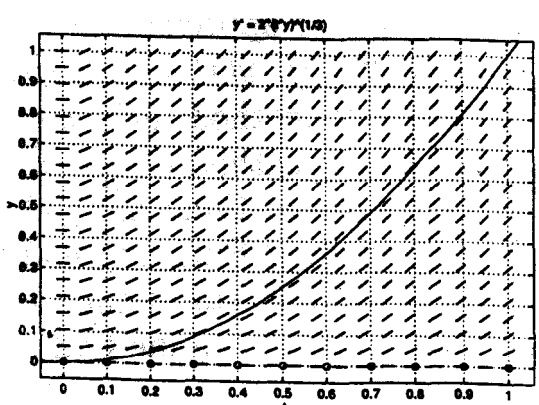
(a) $y' = (y + 1.25)^2, y(0) = 0,$
solution $y = \dfrac{25t}{4(4 - 5t)}$.



(b) $y' = \dfrac{50t}{64(1 - 2y)}, \; y(0) = 0,$
solution $y = \dfrac{1 - \sqrt{1 - 25t^2/16}}{2}$.



(c) $y' = 2(ty)^{1/3}, y(0) = 0,$
solution $y = t^2$.



(d) $y' = 4e^{-t} - 3(1 - y)$, Y(0) = 0,
solution $y = 1 - e^{-t}$.