MA 266 Summer 2001 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 $y = 1 - e^{-t}$.