Topic: Runge Kutta method, Milne's & Adam's predictor & corrector method

1. Given $\frac{dy}{dx} = xy + y^2$; y(0) = 1, y(0.1) =1.1169, y(0.2) = 1.2774. Find (i) y(0.3) by Runge kutta method of fourth order (ii) y(0.4) by Milne's method.
2. Using Runge kutta method of fourth order given that $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, y(0) = 1, at x = 0.2.
3. Using Runge kutta method of fourth order find the value of y at x= 0.2, 0.4, 0.6 given that $\frac{dy}{dx} = x^3 + y$, y(0) = 2. Also find the value of y at x = 0.8 by Milne's method.
4. Given that $\frac{dy}{dx} = \frac{1}{2}(1 + x^2)y^2$; y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21. Evaluate y(0.4) and y(0.5) by Milne's predictor-corrector method.
5. Using Adam's method, find y (0.4) given $\frac{dy}{dx} = \frac{xy}{2}$ y (0) = 1, y(0.1) =1.01, y(0.2) = 1.002 and y(0.3) = 1.023.
6. Given $\frac{dy}{dx} = x - y^2$ y(0) = 0, y(0.2) =0.02, y(0.4) = 0.0795 and y(0.6) = 0.1762. Compute y(0.8) by Milne's method.
7. Determine the value of y(0.4) by Milne's method $y' = xy + y^2$, y(0) = 1. Use Taylor's series method to get the values of y(0.1), y(0.2) and y(0.3).
8. Find y(0.1), y(0.2) and y(0.3) from $y' = x + y^2$; y(0) = 1 by using Runge kutta method of fourth order and then find y(0.4) by Adam's method.
9. Solve the initial value problems, $\frac{dy}{dx} = x - y^2$; y(0) = 1 to find y(0.4) by Adam's Bashforth predictor-corrector method and for starting solutions, use the information below. y(0.1) = 0.9117, y(0.2) = 0.8494. Compute y(0.3) using Runge kutta method of fourth order.