ASSIGNMENT – 1

Last date for submission **is 29-01-2021**

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1**.** Given $\frac{dy}{dx} = \frac{1}{x^2 + y}$, $y(4) = 4$, find $y(4.2)$ by Taylor's series method of order 2, taking h=0.1.

2. Solve $\frac{dy}{dx} = 3x + y^2$, y(0) = 1 in the interval [0, 0.4] by taking h=0.2 using the 3rd orderTaylor's series method.

3. Solve the differential equation $\frac{dy}{dx} = 2y + 3e^x$ with $x_0 = 0, y_0 = 0,$ using Taylor's series method of order 2 to obtain the value of *y at x* = 0.1, 0.2.

4. Given $\frac{dy}{dx} = y - x$,where $y(0) = 2$, find $y(0.1)$ and $y(0.2)$ by Euler's method up to two decimal places.

5. Solve $y' = x - y^2$, y(0) = 1 using the forward Euler method for in [0, 0.6] by taking h = 0.2.

6. Given that $\frac{dy}{dx} = x + y^2$, $y(0)$=1, find $y(0.2)$, using the backward Euler's method.

7. Given $\frac{dy}{dx} = -\frac{y - x}{1 + x}$, with initial condition $y(0) = 1$, find approximately y for $x = 0.1$, by backward Euler's method in two steps.

8. Use modified Euler's method with one step to find the value of y at $x = 0.1$ to five significant figures, where $\frac{dy}{dx} = x^2 + y$, y=0.94, when $x = 0$.

9. Using modified Euler's method, solve numerically the equation $\frac{dy}{dx} = x + |\sqrt{y}|$ with the initial condition $y = 1$ at $x = 0$ in the interval [0, 0.6] in steps of 0.2.

10. Use Runge-Kutta method of order 2 to solve $y' = xy$, y(1) = 1, in [1, 1.4] by taking step-length h = 0.2.

11. Solve the differential equation $\frac{dy}{dx} = \frac{1}{x + y}$, y(0) = 1, in [0, 2] using the fourth-order Runge-Kutta method, step length h = 0.5.

12. Use fourth-order Runge-Kutta method to solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, 0.1, with y(0)=1, find y at x = 0.2, 0.4.

13. Using fourth-order Implicit Runge-Kutta method compute y(0.2), y(0.4) from $\frac{dy}{dx} = x^2 + y^2$, y(0)=1, taking h=0.2.