

# QUIZ #10

ENGR 3723

## PROBLEM 1

A) (20 points) Integrate  $y' = -y + x^2$   $y(0) = 0$  and obtain  $y(1)$ . Use the Euler method. ( $h=0.1$ )

**ANSWER:** See attached Spreadsheet

B) (40 points) Integrate  $y' = -y + x^2$   $y(0) = 0$  and obtain  $y(1)$ . Use the Huen method. ( $h=0.1$ )

**ANSWER:** See attached Spreadsheet

C) (40 points) Integrate  $y' = -y + x^2$   $y(0) = 0$  and obtain  $y(1)$ . Use the second order RK, Ralston option. ( $h=0.1$ )

Help:  $a_2=2/3$

$$a_1 + a_2 = 1$$

$$a_2 p_1 = \frac{1}{2}$$

$$a_2 q_{11} = \frac{1}{2}$$

$$y_{i+1} = y_i + (a_1 k_1 + a_2 k_2)h$$

$$k_1 = f(x_i, y_i)$$

$$k_2 = f(x_i + p_1 h, y_i + q_{11} k_1 h)$$

**ANSWER:**

Thus, with  $a_2=2/3$ , we obtain:  $a_1 = 1/3$ ;  $p_1 = \frac{3}{4}$ ;  $q_{11} = \frac{3}{4}$

Therefore  $y_{i+1} = y_i + \left[ \frac{1}{3}k_1 + \frac{2}{3}k_2 \right]h$  ;  $k_1 = f(x_i, y_i)$  ;  $k_2 = f(x_i + \frac{3}{4}h, y_i + \frac{3}{4}k_1 h)$

See attached Spreadsheet for implementation