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ME5107-Assignment-7
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                                                                                                                                                     y'm= f(y)
                                                            + w, k, + w2 k2
                     YiH = 4:
                                                                                                                                                  y"= x'(y) y'
where
                                                                                                                                                   y"= +" xy"+
                                                              k, = hf (y;)
                                                               Ro = K f (4: + Bok,)
                                                                                                                                                            8'(4) 4"
                                                                                                                                                            = 1" (f)2+
                                                             R2 = h f (y; + B, Ro)
                        y_{iH} = y_{i}(x+h)
y_{i}'
 Now,
           Ro = h[f(yi) + Pok, f'(yi) + (Bok) f'(yi)...]
          R2 = h[f(y;) + B, Rof'(y;) + (B, Ro)2 f"(y;)...]
            = h[f(yi) + B, hf'(yi) {f(yi) + Bok, f'(yi) +
                                                                                                        (Bok), t,(A:)--- }
                                            + h Bo f"(yi) { f(yi) + Bok, &f'(yi) +
                                                                                               (Bok)2 f"(4;)+... ]]
   R_2 = h f(y_i) + \beta_i h^2 f(y_i) + \beta_0 \beta_i h^3 f(y_i) (f'(y_i))^2
                                                +\frac{\beta_{1}^{2}h^{3}}{2}f^{2}(y_{1}) * f''(y_{1}) + \dots
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Substituting R, 4 R2 YiH = Y; + wihf(yi) + wz hf(yi) + W2B, h2f(y;) f'(y;) + w, B,B, K3f(y;) x W2 B, 2 h3 f2 (y;) f"(y;) + Comparing 0 40, w, + w2 = 1 W2B1 = 1 w2 B? W2 Po Bi matio of w. fon but here BodB, 1 & Bo = -4 R=hdy;/koth (4; + B, Ro) & B, hay; &

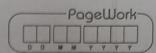
$$y' = \lambda y$$
. $\alpha = ia$
 $f(y_i) = i dy$ (pundy img).

 $K_i = h f(y_i) = i hay$.

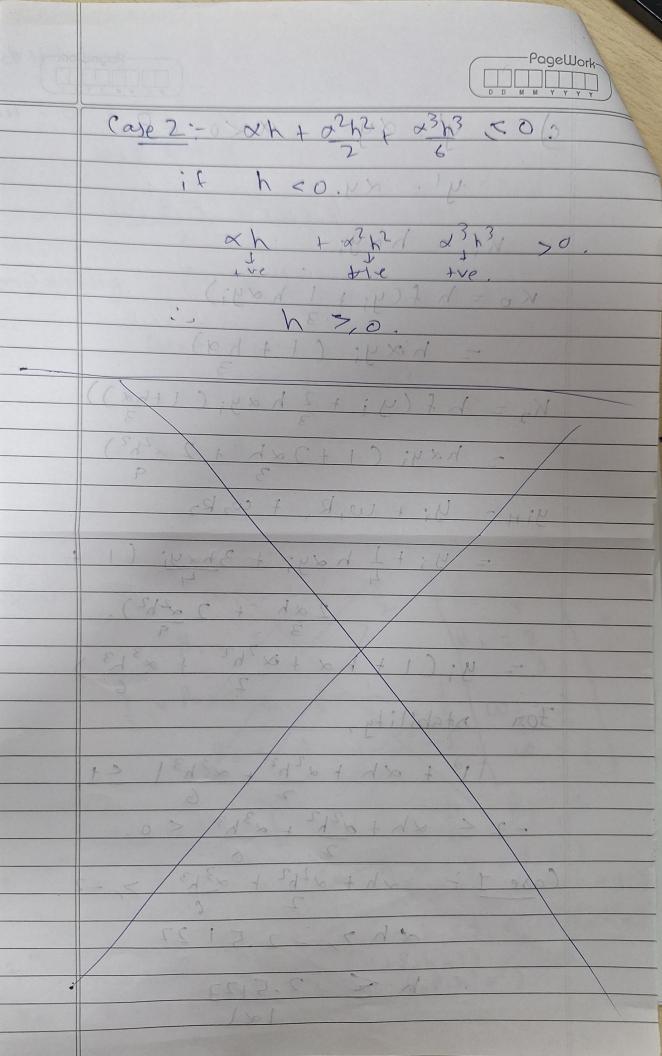
 $K_0 = h f(y_i + \beta_0 K_1)$
 $= h f(y_i + \beta_0 K_1)$
 $= h ay_i (1 + i hay)$
 $K_0 = h ay_i (i - hay)$.

 $K_0 = h ay_i (i - hay)$.

 $K_1 = h f(y_i + \beta_1 k_0)$
 $K_2 = h f(y_i + \beta_1 k_0)$
 $K_3 = h f(y_i + \beta_1 k_0)$
 $K_4 = h f(y_i + \beta_1 k_0)$
 $K_5 = h ay_i (1 - 2a^2h^2 + i2ah)$
 $K_6 = h ay_i (1 - 2a^2h^2 + i2ah)$
 $K_1 = y_1 + y_1 + y_1 + y_2 + y_2 + y_3 + y_4 + y_4 + y_4 + y_5 + y_5 + y_6 +$



c) or y'= xy xxx ex. y1= xy.0001 K, = hay; Ko = h f(y; + 1 h xy;) = hxy; (1+ha) K2 = hf(y; +2 hay; (1 tha)) - hay; (1+2xh + 2x2h2) Yim - Yit wik, + cuzkz = y; + 1 h xy; + 3 h x y; (1 + 2 xh + 2 2h2). y; (1+hx+x2h2+x3h3) For stability, 1) + ah + 22h2 + 23h3 | c1 -2 < xh + 22h2 + 23h3 < 0. Case I; xh+ x2h2 + x3h3 >, -2 dh7, -2.5127 h < 2,5127



2) y'(xi) = 2ty. y"(x(1) = 1 + y'(x) = 1 + xxy y"(x) = 1 + y'(x) = 1 + x ry y""(x)= 1+ y'(x)= 1+x+y. y(x;+h) = y(x;)+h[xi+y;+(+x;+y;)x $(\frac{h}{2} + \frac{h^2}{6} + \frac{h^3}{24})$ y-exact Error y()(; th) $y(x_i)$ 20: 1.11034 1 0 3.37×10-12 1.11034 1.2428 1.11034 0.1 3.64 × 10-11 1.24281 1.3997 1.2428 0.2 3.1 × 10-10 1.39972 1.5836 1.3997 0.3 2.44 × 10-9 1.58365 1.79739 1.5 836 0.4 2.76 × 10-9 1.79744 2.04418 1.79739 0.5 3.32 × 10-9 2.04424 2.32744 1.792.04418 0.6 4.28 × 10-9 2.3275 2.65101 2.32744 5.16 × 10-9 0.7 2.65108 3.01913 2.65101 5.81×10-9 0.8 3.0192 3.43648 3.01913

3.43648 (·. y()= 3.43648] $(a) \alpha_i = 1.$ Foron = (y-exad-y(i))2. where

3.90824

3.43656

0.9

1.0

7 × 10-9