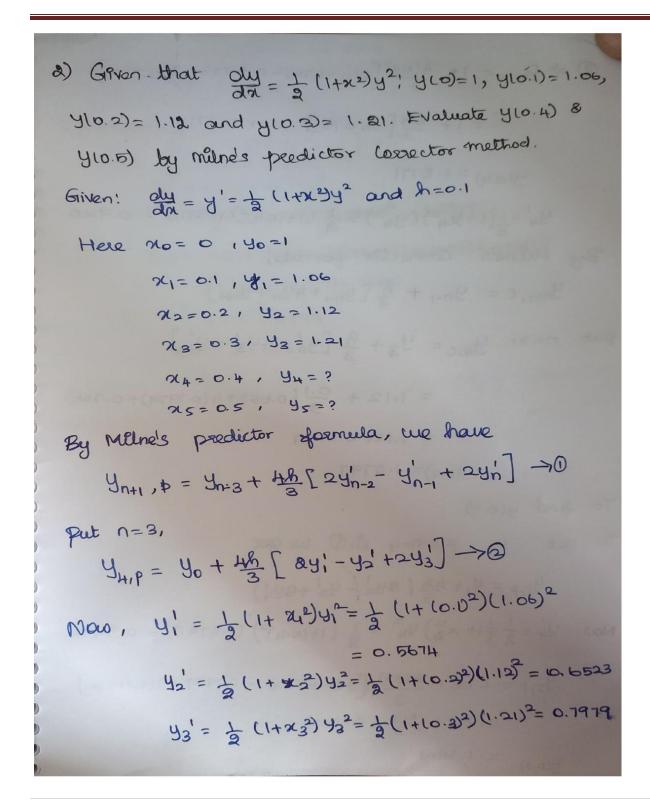


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UNIT 5NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATION MILNE'S PREDICTOR CORRECTOR METHOD FOR SOLVING 1ST ORDER EQUATIONS





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(a)
$$\Rightarrow y_{H/P} = 1 + \frac{4(0.1)}{3} [2(0.5674) - 0.6523 + 3(0.7979)]$$

$$= 1 + \frac{0.1}{3} [2.0783] = 1 + 0.277]$$

$$y_{H/P} = \frac{1}{2} (1 + x_{H/P}^{2}) (y_{H/P}^{2}) = \frac{1}{3} (1 + (0.14)^{2})(1.3771)^{2} = 0.9460$$
By Nutne's Consector formula,
$$y_{h+1, c} = y_{h-1} + \frac{1}{3} [y_{h-1}^{1} + 4y_{h}^{1} + y_{h+1}^{1}]$$
Put $n = 3$, $y_{H/C} = y_{3} + \frac{9}{3} [y_{2}^{1} + 4y_{3}^{1} + y_{4}^{1}]$

$$= 1.12 + \frac{0.1}{3} (0.653 + 4(0.7979) + 0.946)$$

$$= 1.12 + 0.1597$$

$$y_{10, H/P} = 1.2797$$
To find $y_{10, 5}$
To get y_{5} , put $n = 4$ (a) use get
$$y_{5, P} = y_{1} + \frac{1}{12} (8y_{2}^{1} - y_{3}^{1} + 8y_{4}^{1})$$
Now $y_{4}^{1} = \frac{1}{3} (1 + (x_{2}^{2}) y_{4}^{2} = \frac{1}{3} (1 + (x_{3}^{2})^{2}) (1.2797)^{2} = 0.9498$

$$y_{5, P} = 1.06 + \frac{4(0.1)}{3} (2.4062)$$

$$y_{6, 9} = 1.3808$$



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By Milne's corrector formula, we have

$$y_{n+1,c} = y_{n+1} + \frac{1}{3} \left[y_{n-1} + 4y_n + y_{n+1} \right]$$

Put $n=4$,

 $y_{s,c} = y_{3} + \frac{1}{3} \left[y_{3} + 4y_{1} + y_{5}' \right] \rightarrow 0$
 $y_{s}' = \frac{1}{3} \left(1 + (0.5)^{2} \right) \left(1.3808 \right)^{2} = 1.1917$
 $y_{s,c} = 1.21 + \frac{0.1}{3} \left(0.7979 + 4(0.9498) + 1.1917 \right)$
 $= 1.21 + \frac{0.1}{3} \left(5.7888 \right)$
 $= 1.21 + 0.193$
 $y(0.5) = 1.403$