

ZIBIRI MIRACLE

17/ENG03/059

CIVIL ENGINEERING

Q

$$x(x^2-1)y'' + (3x-1)y' + y = 0$$

$$= (x^2-x)y'' + (3x-1)y' + y = 0$$

$$(A_n) y^{n+2}(x^2-x) + n y^{n+1}(2x) + n(n-1)y^n(2) + y^{n+1}(3x-1) + y^n(3) = 0$$

$$B_n = y^{n+1}(3x-1) + n y^n(3)$$

$$C_n = y^n$$

$$= y^{n+2}(x^2-x) + n y^{n+1}(2x) + n(n-1)y^n(2) + y^{n+1}(3x-1) + y^n(3) + y^n = 0$$

$$= y^{n+2}(x^2-x) + y^{n+1}((2x-1)n + (3x-1)) + y^n(n^2 - n + 3x + 1) = 0$$

at $x=0$

$$y^{n+1}(-n-1) + y^n(n^2 + 2n + 1) = 0$$

$$y^{n+1} = -y^n \frac{(n^2 + 2n + 1)}{(n+1)}$$

$$= -y^n (n-1)$$

$$y^{n+1} = -y^n \frac{(n^2 + 2n + 1)}{(n+1)}$$

$$y^{n+1} = -y^n (n+1)$$

at $n=0$

$$y' = y^0(1) = y^0$$

at $n=1$

$$y'' = y'(2) = 2(y^0) = 2y^0$$

at $n=2$

$$y''' = y''(3) = 3(2y^0) = 6y^0$$

at $n=3$

$$y^{(4)} = y'''(4) = 4(6y^0) = 24y^0$$

at $n=4$

$$y^{(5)} = y^{(4)}(5) = 5(24y^0) = 120y^0$$

at $n=5$

$$y^{(6)} = y^{(5)}(6) = 6(120y^0) = 720y^0$$

at $n = 6$

$$y^{vii} = y^{vi}(7) = 7(720 y^0) = 5040 y^1$$

at $n = 7$

$$y^{viii} = y^{vii}(8) = 8(5040 y^0) = 40320 y^0$$

$$= y_0 + \frac{x}{1!} (y^1)_0 + \frac{x^2}{2!} (y^2)_0 + \frac{x^3}{3!} (y^3)_0 + \frac{x^4}{4!} (24 y^1) + \frac{x^5}{5!} (120 y^1) + \frac{x^6}{6!} (720 y^1) + \frac{x^7}{7!} (5040 y^1)$$

$$= y_0 + x(y^1)_0 + x^2(y^2)_0 + x^3(y^3)_0 + x^4(y^4)_0 + x^5(y^5)_0 + x^6(y^6)_0 + x^7(y^7)_0$$

$$y = y_0 + y^1(fx)$$

$$y = 0.0005 \neq y^1$$

at $= 5, 8 \text{ \& } 10$

at 5

$$= 0.0005 + 0.0005 [5^2 + 5^3 + 5^4 + 5^5 + 5^6 + 5^7]$$

$$= 0.0005 + 0.0005 [113125]$$

$$= 0.0005 + 56.5625 = 56.563$$

at $x = 8$

$$y = 0.0005 + 0.0005 [8^2 + 8^3 + 8^4 + 8^5 + 8^6 + 8^7]$$

$$= 0.0005 + 0.0005 (2396744)$$

$$= 1198.373$$

at $x = 10$

$$y = 0.0005 + 0.0005 [10 + 10^2 + 10^3 + 10^4 + 10^5 + 10^6 + 10^7]$$

$$= 0.0005 + 0.0005 (1111110)$$

$$= 0.0005 + 5555.555$$

$$= 5555.555$$

3) Syms x

Syms y

$$x = (0:10);$$

$$y = y = 0.0005 + 0.0005 + (x + (x.^2)) + (x.^3) + (x.^4) + (x.^5) + (x.^6) + (x.^7)$$

Plot (x,y)

Grid on

