

$$y_0^3 = 5y_0^4 + 3ay_0^3 - 6y_0^2$$

when $n=3$

$$y_0^4 = 4y_0^5 + 6ay_0^4 - 24y_0^3$$

when $n=4$

$$y_0^5 = 5y_0^6 + 5(2+4)y_0^5 - 120y_0^4$$

when $n=5$

$$y_0^6 = 6y_0^7 + 6(12+6)y_0^6 - 720y_0^5$$

whence

$$y_0^7 = 7y_0^8 + 7(27+7)y_0^7 - 5040y_0^6$$

when $n=7$

From Melanin Series

$$y = \frac{2^0 y_0}{0!} + \frac{2^1 y_0^2}{1!} + \frac{2^2 y_0^3}{2!} + \frac{2^3 y_0^4}{3!} + \frac{2^4 y_0^5}{4!} + \frac{2^5 y_0^6}{5!} + \frac{2^6 y_0^7}{6!} + \frac{2^7 y_0^8}{7!}$$

$$y = y_0 + 2y_0 + \frac{2^2 y_0^2}{2!} + \frac{2^3 y_0^3}{3!} + \frac{2^4 y_0^4}{4!} + \frac{2^5 y_0^5}{5!} + \frac{2^6 y_0^6}{6!} + \frac{2^7 y_0^7}{7!}$$

$$+ \frac{2^8 y_0^8}{8!}$$

$$y = y_0 + 2y_0 + 2y_0^2 + 2^2 y_0^3 + 2^3 y_0^4 + 2^4 y_0^5 + 2^5 y_0^6 + 2^6 y_0^7 + 2^7 y_0^8$$

$$y = y_0 [1 + 2 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8]$$

where $y_0 = 0.0005$, where $y_0 = \varphi_0$

b) when $x = 5x$

$$y = 0.0005 [1 + 5 + 25 + 125 + 625 + 3125 + 15625 + 78125]$$

$$y = 0.0005 [97656]$$

$$y = 48.822$$

when $n=8$

$$y = 0.0005 [1 + 8r + 64 + 512 + 4096 + 32768 + 262144 + 2,097,152]$$

$$y = 0.0005 [2,396,745]$$

$$y = 1198.3725$$

when $n=10$

$$y = 0.0005 [1 + 10 + 100 + 1000 + 10000 + 100000 + 1000000 + 10000000 + 100000000]$$

$$y = [11, 11, 11] 0.0005$$

$$y = 5,555.555$$

c) Command window

clear

clc

Syms r

Syms y

$$r = (0.10);$$

$$y = 0.0005 (1 + r + (r.^2) + (r.^3) + (r.^4) + (r.^5) + (r.^6) + (r.^7));$$

Plot (x, y)

grid on

grid minor

x label ('a')

y label ('Structural Reformation')