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

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

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

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

$Cn = y^n$

$\Rightarrow y^{n+2}(x^2-x), + n y^{n+1}(2x) + n(n-1)y^n + y^{n+1}$

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

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

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

at $x = 0$

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

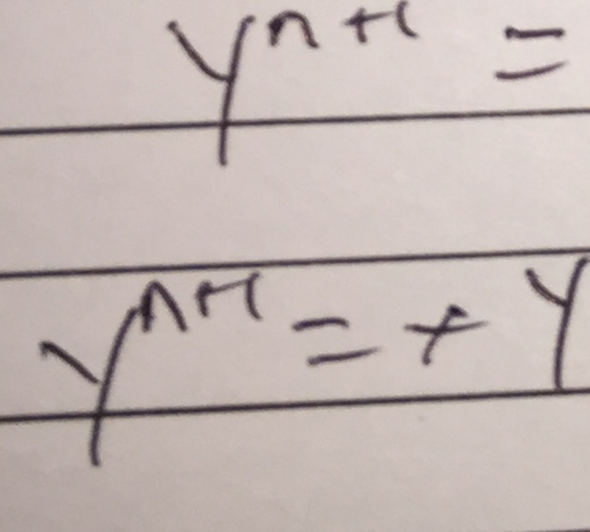
$y^{n+1} = -y^n(n^2+2n+1)$

$= n-1$

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

$\neq (1+n) \qquad (1+n)$

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



Congratulations on your **GRADUATION**

at n = 0

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

at n = 1

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

at n = 2

$y''' = y''(x) = 2(y^1) = 2y^1$

at n = 3

$y^{iv} = y'''(x) = 3(2y^1) = 6y^1$

at n = 4

$y^v = y^{iv}(x) = 4(6y^1) = 24y^1$

at n = 5

$y^{vi} = y^v(x) = 5(24y^1) = 120y^1$

at n = 6

$y^{vii} = y^{vi}(x) = 6(120y^1) = 720y^1$

at n = 7

$y^{viii} = y^{vii}(x) = 7(720y^1) = 5040y^1$

at n = 8

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

$= y_0 + x(y')_0 + \frac{x^2}{2!}(y'')_0 + \frac{x^3}{3!}(y''')_0 + \dots\dots$

$= y_0 + x(y^1)_0 + \frac{x^2}{2!}(xy^1)_0 + \frac{x^3}{3!}(6y^1) + \frac{x^4}{4!}(24y^1)$

$+ \frac{x^5}{5!}(120y^1) + \frac{x^6}{6!}(720y^1) + \frac{x^7}{7!}(5040y^1)$.

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

$+ x^6(y^1) + x^7(y^1)_0$

$y = (y_0 + y'(fx)$

$y = 0.005 \neq y'$

at $x = 5, 8$ & 10.

at 5.

$0.0005 = y_0[5^2 + 5^3 + 5^4 + 5^5 + 5^6 + 5^7]$

$y_5 = 0.0005 + 0.0005[5^2 + 5^3 + 5^4 + 5^5 + 5^6 + 5^7]$

$= 0.0005 + 0.0005[113125]$

$= 0.0005 + 56.5625 = 56.563.$

at $x = 8$.

$y = 0.0005 + 0.0005[8^{y'_0} + 8^2 + 8^3 + 8^4 + 8^5 + 8^6 + 8^7]$

$= 0.0005 + 0.0005(2396744)$

$y = (y)_0$

$0.0005 + 1198.372$

$= 1198.373.$

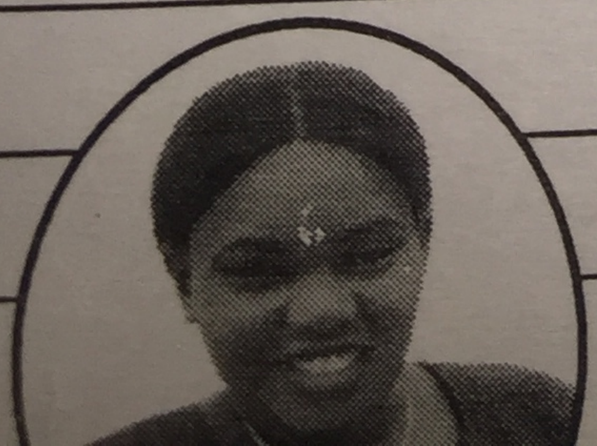
at $x = 10$

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

$= 0.0005 + 0.0005(11111110)$

$0.005 + 5555.555$

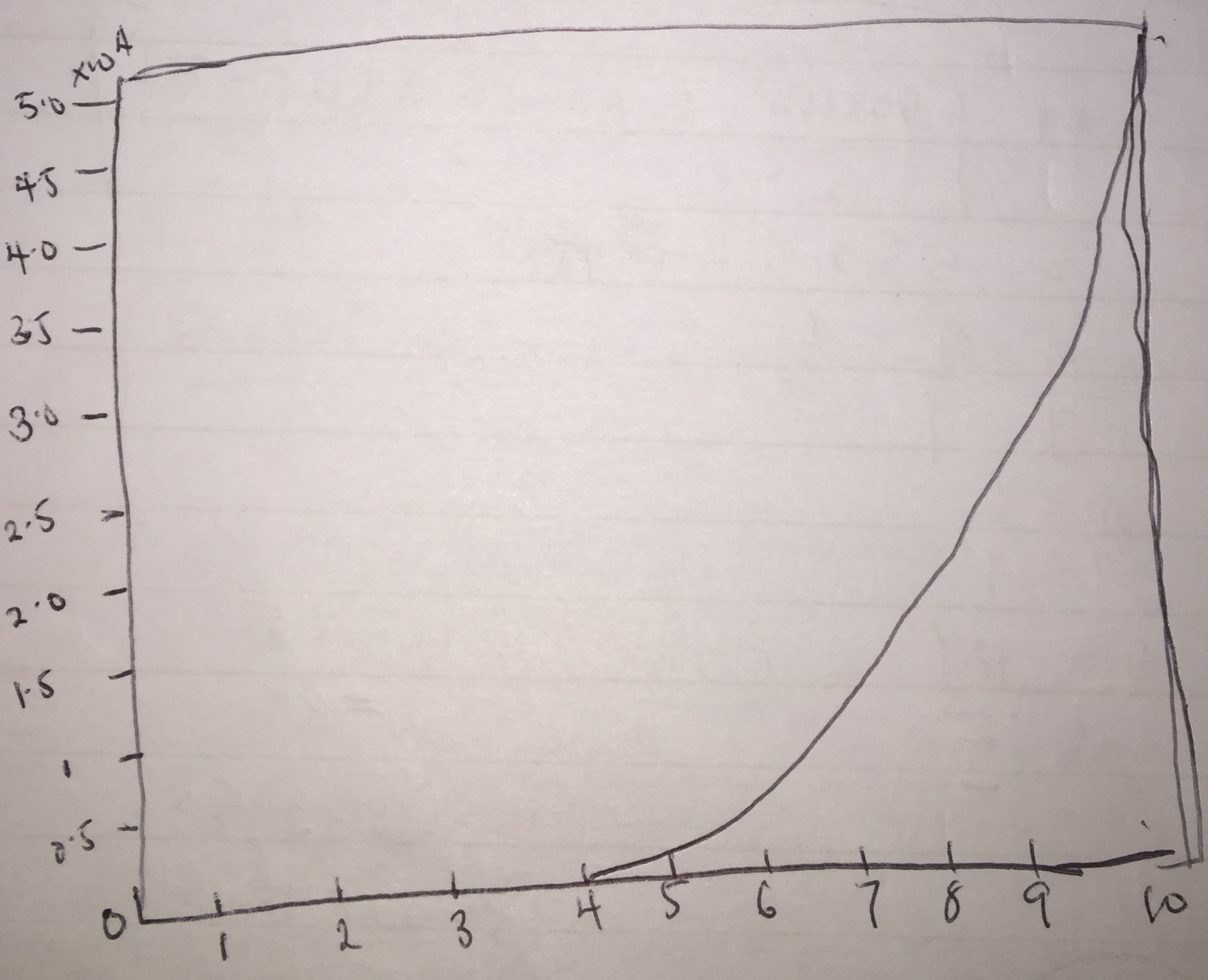
$= 5555.555.$



Congratulations on your **GRADUATION**

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
Grid minor



$(x.^7) + (x.^3)$