MATHEMATICS

ASSIGNMENT-2

Q1) $\dfrac{d^2y}{dx^2} - 4\dfrac{dy}{dx} + 4y = 8x^2 e^{2x} \sin 2x$

A $(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$

$D^2 - 4D + 4 = 0$

$D(D-2) - 2(D-2) = 0$

$D = 2, 2$

$CF = e^{2x}(C_1 + C_2 x)$

$PI = \dfrac{1}{(D^2 - 4D + 4)} 8x^2 e^{2x} \sin 2x$

$= \dfrac{8e^{2x}}{D^2 + \cancel{4D} + 4 - 4D - 8 + 4} x^2 \sin 2x$

$\Rightarrow 8e^{2x} \dfrac{1}{D^2} x^2 \sin 2x$

$= 8e^{2x} \dfrac{1}{D} \{-\frac{1}{2} x^2 \cos(2x) + \frac{1}{2} x \sin(2x) + \frac{1}{4} \cos(2x) + C]$

$\Rightarrow 8e^{2x}[-\frac{1}{4} x^2 \sin(2x) - \frac{1}{4} x \cos(2x) + \frac{1}{8} \sin(2x) + \frac{1}{8} \sin(2x) + \frac{1}{8} \sin 2x + C_1]$

$\Rightarrow e^{2x}(-2x^2 \sin(2x) - 2x \cos(2x) + 3 \sin(2x) + C]$

$y = CF + PI$

$= e^{2x}(C_1 + C_2 x) + e^{2x}[-2x^2 \sin 2x - 2x \cos 2x + 3 \sin 2x]$

Q.2) $D^2x + Dy + 3x = e^{-t}$ — ①
$D^2y - 4Dx + 3y = \sin 2t$ — ②

multiply eq ① by (D^2+3) & ② by D

$(D^2+3)^2x + D(D^2+3)y = (D^2+3)e^{-t}$ — ③
$-4D^2x + D(D^2+3)y = (\sin 2t)(D)$ — ④

On subtracting

$(D^2+3)^2x + D(D^2+3)y + 4D^2x - D(D^2+3)y = e^{-t}(D^2+3) - D(\sin 2t)$

$(D^4+10D^2+9)x = D^2e^{-t} + 3e^{-t} - \sin(2t)D$
$= e^{-t} + 3e^{-t} - 2\cos(2t)$

$(D^4+10D^2+9)x = 4e^{-t} - 2\cos(2t)$
$M = D^2$
$(m^2+10m+9) = 0$
$m^2 + 9m + m + 9 = 0$
$m = -1, -9$
$D^2 = -1$; $D^2 = -9$
$D = \pm i$; $D = \pm 3i$

$CF = [(C_1 + C_2x)\cos x + (C_3 + C_4x)\sin 3x]$

$PI = \frac{1}{(D^4+10D^2+9)}[4e^{-t} - 2\cos(2t)]$

$= \frac{4e^{-t}}{D^4+10D^2+9} - \frac{2}{D^4+10D^2+9}\cos 2t$

$D = -1$; $D^2 = -4$

$$= \frac{4e^{-t}}{1+10+9} - \frac{2}{(-4)^2-10\cdot 4+9} \cos(2t)$$

$$= \frac{e^{-t}}{5} - \frac{2}{15}\cos(2t)$$

$y = CF + PI$

$y = [(c_1 + c_2 x)\cos x + (c_3 + c_4 x)\sin 3x]\left[\frac{e^{t}}{5} - \frac{2}{15}\cos 2t\right] + c$

Q3) $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$

Sol:) $(D^2-1) = 0$

$D = \pm 1$

$CF = Ae^x + Be^{-x}$

$u = e^x \quad ; \quad v = e^{-x}$

$u' = e^x \quad ; \quad v' = -e^{-x}$

$uv' - u'v = e^x\cdot(-e^{-x}) - e^x e^{-x}$

$= -1 - 1$

$= -2$

$R = \frac{2}{1+e^x}$

$A = -\int \frac{RV}{uv'-u'v}\,dx = +\int \frac{\cancel{2}e^{-x}}{(1+e^x)(\cancel{2})}\,dx$

$A = \int \frac{dx}{e^x + e^{2x}}$

$$= -\frac{1}{e^x} - \log|e^x| + \log|1+e^x| + c_1$$

$$B = \int \frac{RU\,dx}{-2} \Rightarrow \int \frac{x e^x}{1+e^x(x)} dx$$

$$= \int \frac{e^x}{1+e^x} dx$$

$$= -\log|1+e^x| + c_2$$

$$y = \left[-\frac{1}{e^x} - \log|e^x| + \log|1+e^x| + c_1\right]e^x - \left[\log|1+e^x| + c_2\right]e^{-x}$$

Q5) $x^2y'' + xy' - y = x^2e^x$

$$y'' + \frac{y'}{x} - \frac{y}{x^2} = e^x$$

$$\left(D^2 + \frac{D}{x} - \frac{1}{x^2}\right)y = e^x$$

$$R = e^x$$

$$x^2y'' + xy' - y = 0$$

$$[D(D-1) + D - 1]\,y = 0$$

$$D^2 - 1 = 0$$

$$D = \pm 1$$

$$y = Ae^z + Be^{-z}$$

$$\Rightarrow z = \log x$$

$$y = Ae^{\log x} + Be^{-\log x}$$

$= Ax + \frac{B}{x}$

$u = x, \quad v = \frac{1}{x}$

$u' = 1 \quad ; v' = -\frac{1}{x^2}$

$uv' - u'v = x \cdot \frac{1}{x^2} - 1 \times \frac{1}{x} \Rightarrow -\frac{2}{x}$

$A = -\int \frac{Rudx}{\frac{2}{x}} \Rightarrow -\int \frac{e^x \cdot \frac{1}{x}}{\frac{2}{x}} dx$

$\Rightarrow \frac{1}{2} e^x + c_1$

$B = \int \frac{RU}{\frac{-2}{x}} dx \Rightarrow \int \frac{e^x x}{\frac{-2}{x}} \Rightarrow -\frac{1}{2} \int x^2 e^x dx$

$\Rightarrow -\frac{1}{2} [x^2 e^x - 2xe^x + 2e^x] + C_2$

$y = [\frac{1}{2} e^x \cdot x + c_1] - \frac{1}{2} [x^2 e^x - 2xe^x + 2e^x + C_2] \frac{1}{x}$

Q6)

$W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} \Rightarrow \begin{vmatrix} e^x & e^{-x} \\ e^x & -e^{-x} \end{vmatrix}$

$= -e^{-x} \cdot e^x - e^x \cdot e^{-x}$

$\Rightarrow -2 \neq 0$

So, clearly it is linearly independent

Newton's

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Q7) $x^4 + 3x^3 - x^2 + 5x = 2$

Sol:) $P_0(x) = 1 \quad \Rightarrow A I = A \cdot P_0(x)$ {where A is const.}

$P_1(x) = x$

$P_2(x) = \frac{1}{2}[3x^2 - 1]$

$2P_2 = 3x^2 - 1$

$x^2 = \frac{2}{3} P_2(x) + \frac{1}{3} P_0(x)$

$P_3(x) = \frac{1}{2}[5x^3 - 3x]$

$5x^3 = 2P_3(x) + 3x$

$x^3 = \frac{2}{5} P_3(x) + \frac{3}{5} \cdot P_1(x)$

$P_4(x) = \frac{1}{8}(35x^4 - 30x^2 + 3)$

$35x^4 = 8P_4(x) + 30x^2 - 3$

$35x^4 = 8P_4(x) + 30\left[\frac{2}{3} P_2(x) + \frac{1}{3} P_0(x)\right] - 3P_0(x)$

$= \frac{1}{35}\{8P_4(x) + 20P_2(x) + 10P_0(x) + 3P_0(x)\}$

$x^4 = \frac{1}{35}[8P_4(x) + 20P_2(x) + 7P_0(x)]$

\# $x^4 + 3x^3 - x^2 + 5x - 2 = 0$

$\frac{1}{35}[8P_4(x) + 20P_2(x) + 7P_0(x)] + 3\left[\frac{2}{5} P_3(x) + \frac{3}{5} P_1(x)\right] -$

$\frac{2}{3} P_2(x) + \frac{1}{3} P_0(x) + 5P_1(x) - 2P_0(x) - \cancel{0}$

Q7) $x^4 + 3x^3 - x^2 + 5x = 2$

Sol:) $P_0(x) = 1 \Rightarrow A I = A \cdot P_0(x)$ {where A is const.}

$P_1(x) = x$

$P_2(x) = \frac{1}{2}[3x^2 - 1]$

$2P_2 = 3x^2 - 1$

$x^2 = \frac{2}{3} P_2(x) + \frac{1}{3} P_0(x)$

$P_3(x) = \frac{1}{2}[5x^3 - 3x]$

$5x^3 = 2P_3(x) + 3x$

$x^3 = \frac{2}{5} P_3(x) + \frac{3}{5} \cdot P_1(x)$

$P_4(x) = \frac{1}{8}(35x^4 - 30x^2 + 3)$

$35x^4 = 8P_4(x) + 30x^2 - 3$

$35x^4 = 8P_4(x) + 30\left[\frac{2}{3} P_2(x) + \frac{1}{3} P_0(x)\right] - 3P_0(x)$

$= \frac{1}{35}[8P_4(x) + 20P_2(x) + 10P_0(x) + 3P_0(x)]$

$x^4 = \frac{1}{35}[8P_4(x) + 20P_2(x) + 7P_0(x)]$

$x^4 + 3x^3 - x^2 + 5x - 2 = 0$

$\frac{1}{35}[8P_4(x) + 20P_2(x) + 7P_0(x)] + 3\left[\frac{2}{5} P_3(x) + \frac{3}{5} P_1(x)\right] -$

$\frac{2}{3} P_2(x) + \frac{1}{3} P_0(x) + 5P_1(x) - 2P_0(x) - \cancel{0}$

Q9) $\frac{d}{dx}[x J_n J_{n+1}] = x[J_n^2 - J_{n+1}^2]$

Sol:) $J_n J_{n+1} + x[J'_n J_{n+1} + J_n J'_{n+1}]$ — ①

from 3rd recurrence relation

$J'_n = J_{n-1} - \frac{n}{x} J_n$

Replace by n+1

$J'_{n+1} = J_n - \frac{n+1}{x}(J_{n+1})$ — ②

from 4th recurrence relation

$J'_n = -J_{n+1} + \frac{n}{x} J_n$ — ③

On substituting

$J_n J_{n+1} - x J_{n+1}^2 + n J_n J_{n+1} + x J_n^2 - (n+1) J_n J_{n+1}$
$= x(J_n^2 + J_{n+1}^2) \longrightarrow$ HP

Q10) $x\frac{d^2y}{dx^2} + \frac{dy}{dx} + xy = 0$

Sol:) $P_0(x) = x$; $P_1(x) = 1$; $P_2(x) = x$

Now at $x=0$; $P_0(0) = 0 \rightarrow$ singular point

$\lim_{x\to a} (x-a)\frac{P_1(x)}{P_0(x)}$

$\lim_{x\to 0} x \cdot \frac{1}{x}$

$\lim_{x\to a} (x-a)^2 \frac{P_2(x)}{P_0(x)}$

$\lim_{x\to 0} x^2 \cdot \frac{x}{x} = 0$ finite

By frobenious method

$$y = \sum_{n=0}^{\infty} a_n x^{m+n}$$

$$\frac{dy}{dx} = \sum_{n=0}^{\infty} (m+n) a_n x^{m+n-1}$$

$$\frac{d^2y}{dx^2} = \sum_{n=0}^{\infty} (m+n)(m+n-1) a_n x^{m+n-2}$$

Put the value of $y, \frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$ in eq. ①

$$\Rightarrow x\left[\sum_{n=0}^{\infty}(m+n)(m+n-1)a_n x^{m+n-2}\right] + \left[\sum_{n=0}^{\infty}(m+n)a_n x^{m+n-1}\right] + x\left[\sum_{n=0}^{\infty} a_n x^{m+n}\right]$$

$$\Rightarrow \sum_{n=0}^{\infty}(m+n)(m+n-1)a_n x^{m+n-1} + \sum_{n=0}^{\infty} a_n x^{m+n+1}$$

$$\Rightarrow \sum_{n=0}^{\infty}\left[(m+n)(m+n-1)+(m+n)\right]a_n x^{m+n-1} + \sum_{n=0}^{\infty} a_n x^{m+n+1} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty}\left[(m+n)^2 a_n x^{m+n-1}\right] + \sum_{n=0}^{\infty} a_n x^{m+n+1} = 0 \quad \text{—②}$$

now equating least power of x i.e $x^{m-1} = 0$

$$(m^2)a_0 = 0$$
$$m^2 = 0 \quad \Rightarrow m = 0, 0$$
$$m_1 = 0, \; m_2 = 0$$

from eq ②

$$\sum_{n=0}^{\infty} (m+n+1)^2 a_{n+1} x^{m+n} + \sum_{n=0}^{\infty} a_{n-1} x^{m+n} = 0$$

$$\sum_{n=0}^{\infty} \{(m+n+1)^2 a_{n+1} + a_{n-1}\} x^{m+n} = 0 \quad \text{—③}$$

Put the coeff of $x^{m+1} = 0$

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

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

Put $n=1$

$$a_2 = -\frac{1}{(m+2)^2} a_0$$

$n=2$

$$a_3 = -\frac{1}{(m+3)^2} a_1 \quad [a_1 = 0]$$

Now by equating coeff of x^m both side

$(m+1)^2 a_1 x^m = 0$

$a_1 = 0$

$a_3 = 0$, put $n=3$

$$a_4 = \frac{-1}{(m+4)^2} a_3 \quad [a_3 = 0]$$

$a_4 = 0$

$n=4$

$$a_5 = \frac{-1}{(m+5)^2} a_4 \; ; \; a_5 = 0$$

Now
$$\Rightarrow \sum_{n=0}^{\infty} a_n x^{m+n}$$

$= a_0 x^m + a_1 x^{m+1} + a_2 x^{m+2} + a_3 x^{m+3} + a_4 x^{m+4} + \dots$

$$\Rightarrow x^m \left[a_0 + (n) \cdot \frac{x^2}{(m+1)^2} + (0)x^3 + (0)x^4 + \dots \infty\right]$$

$$\Rightarrow y = x^m \left[a_0 - \frac{a_0 x^2}{(m+2)^2}\right]$$

$$y = a_0 x^m \left[1 - \frac{x^2}{(m+2)^2}\right] \quad -⑤$$

$$y = c_1 (y)_{m=0} + c_2 \left(\frac{dy}{dm}\right)_{m=0}$$

$$(y)_{m=0} = a_0 x_0^0 \left[1 - \frac{x^2}{2^2}\right]$$

$$\Rightarrow a_0 \left[1 - \frac{x^2}{2^2}\right]$$

Now partially diff eq ⑤ wrt m

$$\frac{dy}{dm} = a_0 x^m \log x \left[1 - \frac{x^2}{(m+2)^2}\right] + a_0 x^m \left[0 - \left(\frac{-2x^2}{(m+2)^2}\right)\right]$$

$$= a_0 x^m \log x \left[1 - \frac{x^2}{(m+2)^2}\right] + a_0 x^m \left[\frac{2x^2}{(m+2)^2}\right]$$

$$\left.\frac{dy}{dm}\right|_{m=0} \Rightarrow a_0 (1) \log x \left[1 - \frac{x^2}{2^2}\right] + a_0 (1) \left[\frac{2x^2}{2^3}\right]$$

$$y = c_1 \left[a_0 \left(1 - \frac{x^2}{2^2}\right)\right] + c_3 \left\{a_0 \left[\log\left(1 - \frac{x^2}{2^2}\right) + \frac{2x^2}{2^3}\right]\right.$$

$$y = A\left(1 - \frac{x^2}{2^2}\right) + B\left[\log x \left(1 - \frac{x^2}{2^2}\right) + \frac{2x^2}{2^3}\right. \rightarrow \text{Ans}$$

Q4) $2x(1-x)\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx}$

Sol) $P_0(x) = 2x(1-x)$

$P_1(x) = 1-x$

$P_2(x) = 3$

now at $x = 0$

~~for~~ $P_0(0) = 0 \longrightarrow$ singular pt

$P_1(0) = 1$

$P_2(0) = 3$

(1) Determination of

$$\lim_{x \to a} (x-a) \frac{P_1(x)}{P_0(x)} \qquad \lim_{x \to a} (x-a)^2 \frac{P_2(x)}{P_0(x)}$$

$$\lim_{x \to 0} \frac{x(1-x)}{2x(1-x)} = \frac{1}{2} \qquad \lim_{x \to 0} (x-0)^2 \frac{3}{2x(1-x)}$$

$$\lim_{x \to 0} \frac{x^{\cancel{2}} 3}{2x(1-x)}$$

$$\lim_{x \to 0} \to 0 \text{ (finite)}$$

Now it is regular singular point

By Frobenious method :-

$$y = \sum_{n=0}^{\infty} a_n x^{m+n}$$

$$\frac{dy}{dx} = \sum_{n=0}^{\infty} (m+n) a_n x^{m+n-1}$$

$$\frac{d^2y}{dx^2} = \sum_{n=0}^{\infty} (m+n)(m+n-1) a_n x^{m+n-2}$$

Now, put the value of $y, \frac{dy}{dx}, \frac{d^2y}{dx^2}$

$$\Rightarrow 2x(1-x)\left[\sum_{n=0}^{\infty}(m+n)(m+n-1)a_n x^{m+n-2}\right] + (1-n)\left[\sum_{n=0}^{\infty}(m+n)a_n x^{m+n-1}\right]$$
$$+3\left[\sum_{n=0}^{\infty} a_n x^{m+n}\right] = 0$$

$$\Rightarrow 2x - 2n^2\left[\sum(m+n)(m+n-1)a_n x^{m+n-2}\right] + (1-n)\left[\sum_{n=0}^{\infty}(m+n)a_n x^{m+n-1}\right]$$
$$+3\left[\sum_{n=0}^{\infty} a_n x^{m+n}\right] = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} 2(m+n)(m+n-1)a_n x^{m+n-1} - \sum_{n=0}^{\infty} 2(m+n)(m+n-1)a_n x^{m+n} + \sum_{n=0}^{\infty}(m+n)a_n x^{m+n-1}$$
$$- \sum_{n=0}^{\infty}(m+n)a_n x^{m+n} + \sum_{n=0}^{\infty} 3a_n x^{m+n} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} [2(m+n)(m+n-1)+(m+n)]a_n x^{m+n-1} - \sum_{n=0}^{\infty} [2(m+n)(m+n-1)+(m+n)-3]a_n x$$

$$\Rightarrow \sum_{n=0}^{\infty} [2(m+n-1)+1](m+n)a_n x^{m+n-1} - \sum_{n=0}^{\infty} [[2(m+n-1)+1](m+n)-3]a_n x^{m+n} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} (2m+2n-1)(m+n)a_n x^{m+n-1} - \sum_{n=0}^{\infty} [(2m+2n-1)(m+n)-3]a_n x^{m+n} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} (2m+2n-1)(m+n)a_n x^{m+n-1} - \sum_{n=0}^{\infty} (2(m+n)^2-(m+n)-3]a_n x^{m+n} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} (2m+2n-1)(m+n)a_n x^{m+n-1} - \sum_{n=0}^{\infty} (2(m+n)^2-(m+n)-3]a_n x^{m+n} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} (2m+2n-1)(m+n)a_n x^{m+n-1} - \sum_{n=0}^{\infty} [2(m+n)-3)(m+n+1)]a_n x^{m+n} = 0 \quad -① $$

Now, put coeff of lowest power of x i.e:- x^{m-1} to zero

$(2m+2n-1)(m+n)a_n = 0$

$(2m+0-1)(m+0)a_0 = 0$

$(2m-1)(m)a_0 = 0$

$(2m-1)(m) = 0$

$m = \frac{1}{2}$; $m = 0$

Now $m_1 \neq m_2$

$m_1 - m_2 = \frac{1}{2}$; $\frac{1}{2} \neq$ integer

from eq ②

$$\Rightarrow \sum_{n=0}^{\infty} [2m+2(n+1)-1](m+n-1)a_{n+1} x^{m+n} - \sum_{n=0}^{\infty} (2m+2n-3)(m+n+1)a_n x^{m+n} = 0$$

$$\Rightarrow \sum_{n=0}^{\infty} (2m+2n+1)(m+n+1)a_{n+1} x^{m+n} - (2m+2n-3)(m+n-1)a_n]x^{m+n}$$

Now by equating coeff. of x^{m+n} to zero

$D_n = 4n \times R$

$$(2m+2n+1)(m+n+1)a_{n+1} - (2m+2n-3)(m+n-1)a_n = 0$$

$$a_{n+1} = \frac{(2m+2n-3)(m+n-1)a_n}{(2m+2n+1)(m+n-1)}$$

put $n=0$ in eq ③

$$a_1 = \left(\frac{2m-3}{2m+1}\right)a_0$$

put $n=1$ in eq ③

$$a_2 = \left(\frac{2m-1}{2m+3}\right)a_1 \Rightarrow \frac{2m-1}{2m+3} \times \left(\frac{2m-3}{2m+1}\right)a_0$$

$$a_2 = \frac{(2m-1)(2m-3)}{(2m+3)(2m+1)}a_0$$

Put $n=2$ in eq 3

$$a_3 = \left(\frac{2m+1}{2m+5}\right)a_2$$

$$\Rightarrow \left(\frac{\cancel{2m+1}}{2m+5}\right)\left[\frac{(2m-1)(2m-3)}{(2m+3)\cancel{(2m+1)}}\right]a_0$$

$$\Rightarrow \frac{(2m-1)(2m-3)}{(2m+5)(2m+3)}a_0$$

$$y = C_1(y)_{m=m_1} + C_2(y)_{m=m_2} \quad \text{— ④}$$

$$y = \sum_{n=0}^{\infty} a_n x^{m+n} = a_0x^m + a_1x^{m+1} + a_2x^{m+2} + a_3x^{m+3} + \dots$$

Put the value of a_0, a_1, a_2, a_3 we get

$$y = a_0x^m + \left[\left(\frac{2m-3}{2m+1}\right)a_0\right]x^{m+1} + \left[\frac{(2m-1)(2m-3)}{(2m+3)(2m-1)}a_0\right]x^{m+2} + \left[\frac{(2m-1)(2m-3)}{(2m+5)(2m+3)}a_0\right]x^{m+3} + \dots$$

Determination of wavelength of Na light using Newton's Ring

$D_n^2 = 4n\lambda R$ —— (1) Diameter for dark ring

$(y)_{m=\frac{1}{2}} = a_0\sqrt{x} + \frac{(1-3)}{(1+1)} a_0 x^{3/2} + \left[\frac{(1-1)(1-3)}{(1+3)(1+1)} a_0\right] x^{5/2} + \left[\frac{(1-1)(1+3)}{(1+5)(1+3)} a_0 x^{7/2}\right]$

$\Rightarrow a_0\sqrt{x} + \frac{(-2)}{2} a_0 x^{3/2} + 0 + 0 - - -$

$\Rightarrow a_0 (x^{1/2} - x^{3/2})$

Now, at $m=0$

$(y)_{m=0} = a_0 x^0 + \frac{(-3)}{(-1)} a_0 x^1 + \frac{(-1)(-3)}{(3)(1)} a_0 x^2 + \frac{(-1)(-3)}{(5)(3)} a_0 x^3 + - - -$

$(y)_{m=0} = a_0 [1 - 3x + x^2 + \frac{1}{5}x^3 + - - - + \infty]$

Now eq (4)

$y = c_1 (y)_{m=\frac{1}{2}} + c_2 (y)_{m=0}$

$= c_1 [a_0 (x^{1/2} - x^{3/2})] + c_2 [a_0 (1 - 3x + x^2 + \frac{x^3}{5} + - - - \infty)$

$= A(x^{1/2} - x^{3/2}) + B(1 - 3x + x^2 + \frac{x^3}{5} + - - - \infty)$ —— (7)

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