

# QUIZ #8 YOUR MASTER MTH 225

$$\textcircled{1} \quad x^3 y^{(4)} - 6y = 0 \quad a_n x^n y^{(n)} + \dots + a_1 x y' + a_0 y = 0$$

$$y = x^r$$

$$x^3 (x^r)^{(4)} - 6x^r = 0$$

$$x^3 r(r-1)(r-2)(r-3) - 6x^r = 0$$

$$x^3 r(r-1)(r-2)(r-3) - 6x^r = 0$$

$$x^3 r(r-1)(r-2)(r-3) = 6x^r$$

$$= r(r-1)(r-2)(r-3) - 6 = 0$$

$$r(r-1)(r-2)(r-3) - 6 = 0$$

$$r(r-1)(r-2)(r-3) - 6 = 0$$

$$r \neq 0$$

$$r(r-1)(r-2)(r-3) - 6 = 0$$

$$r^3 - 3r^2 + 2r - 6 = 0$$

$$(r-3)(r^2+2) = 0$$

$$r = 3 \quad r = \pm \sqrt{2}i$$

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$$y = c_1 x^3$$

$$r_1 \neq r_2$$

$$r_1 = a + bi \quad r_2 = a - bi$$

$$r_2 =$$

① QUR #18 MTH225 NOOR MUSTAFI

$$x^0 (c_2 \cos(\sqrt{2} \ln(x)) + c_3 \sin(\sqrt{2} \ln(x)))$$
$$c_2 \cos(\sqrt{2} \ln(x)) + c_3 \sin(\sqrt{2} \ln(x))$$

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$$y = c_1 x^3 + c_2 \cos(\sqrt{2} \ln(x)) + c_3 \sin(\sqrt{2} \ln(x))$$

↑  
general  
solution

$$(2) x^5 y'' - 4y' = x^4$$

$$y = y_h + y_p$$

$$y = x^r \quad x^5 y'' - 4y' = 0$$

$$x (x^r)'' - 4(x^r)' = 0$$

$$(x^r)'' = r x^{r-2} (r-1)$$

$$(x^r)' = r x^{r-1}$$

$$x r x^{r-2} (r-1) - 4 r x^{r-1} = 0$$

$$r^2 x^{r-1} - 5 r x^{r-1} = 0$$

$$x^{r-1} (r^2 - 5r) = 0$$

$$x^{r-1} \neq 0$$

$$r^2 - 5r = 0$$

$$r_{1,2} = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(0)}}{2}$$

$$r_1 = 5 \quad r_2 = 0$$

$$y = c_1 x^{r_1} + c_2 x^{r_2}$$

$$y = c_1 x^5 + c_2 x^0$$

$$y = c_1 x^5 + c_2$$

2

$$y'' = \frac{xy''}{x} - \frac{yy'}{x} = x^4$$

$$y'' - \frac{yy'}{x} = x^4$$

$$\begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = 0$$

$$\begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = 2(x)$$

$$u_1 = \int \frac{-y_2 g(x)}{w} dx$$

$$u_2 = \int \frac{y_1 g(x)}{w} dx$$

$$u_1 = \int \frac{-1(x^3)}{-5x^4} dx$$

$$= \frac{-1}{-5} \int \frac{x^3}{x^4} dx$$

$$= \frac{1}{5} \int \frac{1}{x} dx$$

$$= \frac{1}{5} \ln(x) + C$$

$$u_1 = \frac{1}{5} \ln(x)$$

$$y_1 = x^5$$

$$y_2 = 1$$

$$y_1' = 5x^4$$

$$y_2' = 0$$

$$w(y_1, y_2) = x^5 \cdot 0 - 5x^4 \cdot 1$$

$$w = -5x^4$$

$$u_2 = \int \frac{x^5 x^3}{-5x^4} dx$$

$$= \frac{1}{-5} \int \frac{x^5 x^3}{x^4} dx$$

$$= \left(\frac{1}{-5}\right) \int x^4 dx$$

Power Rule

$$= \left(-\frac{1}{5}\right) \frac{x^{4+1}}{4+1}$$

$$= -\frac{1}{5} \cdot \frac{x^5}{5}$$

2018 MTH 225 New method

2

$$= -\frac{x^5}{25} + C$$

$$u_2 = -\frac{x^5}{25}$$

$$y_p = u_1 y_1 + u_2 y_2$$

$$y_p = \frac{1}{5} \ln(x) x^5 + \left(-\frac{x^5}{25}\right) \cdot 1$$

$$y_p = \frac{1}{5} x^5 \ln(x) - \frac{x^5}{25}$$

$$y = y_g + y_p \leftarrow \text{formula for general solution}$$

$$y = C_1 x^5 + C_2 + \frac{1}{5} x^5 \ln(x) - \frac{x^5}{25}$$

↑  
general  
solution



③  $x^2 y'' - 5xy' + 8y = 0$ ,  $y(2) = 32$ ,  $y'(2) = 0$

$\lambda x^2 y'' + bxy' + cy = 0$   $y = x^r$

$x^2 (x^r)'' - 5x(x^r)' + 8x^r = 0$

$(x^r)'' = r x^{r-2} (r-1)$

$(x^r)' = r x^{r-1}$

$x^2 r x^{r-2} (r-1) - 5x r x^{r-1} + 8x^r = 0$

$r^2 x^r - 6r x^r + 8x^r = 0$

$x^r (r^2 - 6r + 8) = 0$

$x^r \neq 0$

$a=1$   
 $b=-6$   $r_{1,2} = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(8)}}{2(1)}$   
 $c=8$

$r_1 = 4$   $r_2 = 2$

$y = C_1 x^4 + C_2 x^2$

$32 = C_1 \cdot 2^4 + C_2 \cdot 2^2$

$C_1 = \frac{8 - C_2}{4}$

Q.2 #8) MTH 225 | Now must be

3)  $y = \frac{8 - c_2}{4} x^4 + c_2 x^2$

$$y = \frac{x^4(8 - c_2)}{4} + c_2 x^2$$

$$0 = 2^3(8 - c_2) + 2c_2 \cdot 2$$

$$2^3(-c_2 + 8) + 4c_2 = 0$$

$$8(8 - c_2) + 4c_2 = 0$$

$$64 - 8c_2 + 4c_2 = 0$$

$$64 - 4c_2 = 0$$

$$\frac{-4c_2}{-4} = \frac{-64}{-4}$$

$$c_2 = 16$$

for  $y = \frac{x^4(8 - c_2)}{4} + c_2 x^2$

$$y = \frac{x^4(8 - 16)}{4} + 16x^2$$

$$y = -2x^4 + 16x^2$$