

Name, Surname:

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Engineering Mathematics

Find the general solution of the differential equation given below

$$(D^2 - 4D + 3)y = 10\sin(2t)$$

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

$$\begin{array}{c} \wedge \\ -1 \quad -3 \end{array}$$

$$x_1 = 1 \quad x_2 = 3$$

$$y_h = c_1 e^t + c_2 e^{3t}$$

$$y_p = A \sin 2t + B \cos 2t$$

$$y_p' = 2A \cos 2t - 2B \sin 2t$$

$$y_p'' = -4A \sin 2t - 4B \cos 2t$$

$$-4A \sin 2t - 4B \cos 2t - 4(2A \cos 2t - 2B \sin 2t) + 3(A \sin 2t + B \cos 2t) = 10 \sin(2t)$$

$$8B - A = 10$$

$$-B - 8A = 0$$

$$B = -8A$$

$$A = -\frac{2}{13}$$

$$B = \frac{16}{13}$$

$$y_p = -\frac{2}{13} \sin 2t + \frac{16}{13} \cos 2t$$

$$y_g = y_h + y_p = c_1 e^t + c_2 e^{3t} - \frac{2}{13} (\sin 2t - 8 \cos 2t)$$