

For full credit, you must show all work and circle your final answer.

- 1 Using the method of undetermined coefficients, write the form of the particular solution.
DO NOT FIND THE COEFFICIENTS.

a) $y'' - 5y' + 4y = 3\sin(3t)$

$\alpha = 0 \quad \beta = 3 \quad \alpha + i\beta = 3i$ Not a root

$$y_p(t) = A\sin(3t) + B\cos(3t)$$

Side work:

$$r^2 - 5r + 4 = 0$$

$$\Rightarrow (r-4)(r-1) = 0$$

$$r = 4, 1 \text{ roots}$$

b) $y'' - 5y' + 4y = 3t^2e^{5t}$ $m=2 \quad r=5$ Not a root

$$y_p(t) = (A_2t^2 + A_1t + A_0)e^{5t}$$

c) $y'' - 5y' + 4y = t^3e^{4t}$ $m=3 \quad r=4$ is a root $\Rightarrow 3=1$

$$y_p(t) = t(A_3t^3 + A_2t^2 + A_1t + A_0)e^{4t}$$

d) $y'' - 5y' + 4y = (t^2 + 2t + 1)e^{-3t}$ $m=2 \quad r=-3$ Not a root

$$y_p(t) = (A_2t^2 + A_1t + A_0)e^{-3t}$$

e) $y'' - 5y' + 4y = (2t + 1)e^{-t}\sin(t) + (4t^2 + 2t + 3)e^{-t}\cos(t)$

$$K = \max\{1, 2\} = 2$$

$$\alpha = -1 \quad \beta = 1 \quad \alpha \pm i\beta \text{ Not a root}$$

$$y_p(t) = (A_2t^2 + A_1t + A_0)e^{-t}\sin(t) + (B_2t^2 + B_1t + B_0)e^{-t}\cos(t)$$