

Math 207 Quiz #7 Answers

1. Auxiliary Equation: $2r^2 - 2r - 12 = 0 \Rightarrow 2(r - 3)(r + 2) = 0 \Rightarrow r = -2, r = 3$

So, the form of particular solution would be $y_p = t(At + B)e^{3t}$. (We need the extra t given that $r = 3$ is a solution to the auxiliary equation.)

2. Auxiliary Equation: $r^3 + r = 0 \Rightarrow r(r^2 + 16) = 0 \Rightarrow r = 0, r = \pm 4i$

General solution to homogeneous equation: $y_h = c_1 + c_2 \cos 4t + c_3 \sin 4t$

Particular solution: $y_p = Ae^x \Rightarrow y_p = \frac{10}{17}e^x$ (after matching coefficients)

General solution to the DE: $y = c_1 + c_2 \cos 4t + c_3 \sin 4t + \frac{10}{17}e^x$

3. (a) DE: $y'' + 4y' + 5y = 0$

Auxiliary Equation: $r^2 + 4r + 5 = 0 \Rightarrow r = -2 \pm i$

General equation: $y = c_1 e^{-2t} \cos t + c_2 e^{-2t} \sin t$

Using the initial conditions $y(0) = 2, y'(0) = 3: c_1 = 2, c_2 = 7$

Equation of Motion: $y = 2e^{-2t} \cos t + 7e^{-2t} \sin t$

(b) Since the angular velocity is 1, the quasifrequency is $\frac{1}{2\pi}$ cycles/sec.