

Math 207 Quiz #7 Answers

1. The solutions to the auxiliary equation $r^3 + r = 0$ are $r = 0$, and $r = \pm i$.

General solution: $y = c_1 + c_2 \cos t + c_3 \sin t$ for constants c_1, c_2, c_3

2. Note that the solutions to the auxiliary equation are $r = 1 \pm 2i$. So, the particular solution will have the form $y_p = t(A_1 t + A_0)e^t \cos t + t(B_1 t + B_0)e^t \sin t$ for constants A_0, A_1, B_0, B_1

3. Solution to the homogeneous equation: $z_h = c_1 e^{-x} + c_2 x e^{-x}$ for constants c_1, c_2
(Aux. eqn. has the double root $r = -1$)

Form of particular solution: $z_p = A + (Bx + C)e^x$ for constants A, B, C

Using the method of undetermined coefficients: $z_p = 1 + \frac{1}{2}(x - 1)e^x$

General solution: $z = c_1 e^{-x} + c_2 x e^{-x} + 1 + \frac{1}{2}(x - 1)e^x$

Using the initial conditions: $z = 2.5e^{-x} + 2.5xe^{-x} + 1 + \frac{1}{2}(x - 1)e^x$