

9. THE CHARACTERISTIC EQN IS

$$r^6 - 5r^5 + 4r^4 - 20r^3 = 0$$

$$r^3 (r^3 - 5r^2 + 4r - 20) = 0$$

$$r^3 [r^2(r-5) + 4(r-5)] = 0$$

$$r^3 (r-5) (r^2+4) = 0$$

$$r=0 \text{ (TRIPLE ROOT)}$$

$$r=5 \text{ (DISTINCT ROOT)}$$

$$r^2+4=0$$

$$r^2 = -4$$

$$r = \pm\sqrt{-4} = \pm 2i$$

THE GENERAL SOLUTION IS

$$y = C_1 + C_2 t + C_3 t^2 + C_4 e^{5t} + C_5 \cos(2t) + C_6 \sin(2t)$$