

Math 266 Summer 2016 Quiz 7

1) Find the general solution to $y^{(4)} + 10y'' + 25y = 0$.

$$r^4 + 10r^2 + 25 = 0 \quad r = \pm \sqrt{5}i, \pm \sqrt{5}i$$

$$(r^2 + 5)^2 = 0$$

$$y(t) = c_1 \cos(\sqrt{5}t) + c_2 \sin(\sqrt{5}t) + c_3 t \cos(\sqrt{5}t) + c_4 t \sin(\sqrt{5}t)$$

2) Find the general solution to $y^{(6)} - y^{(4)} = t$.

$$r^6 - r^4 = 0 \Rightarrow r^4(r^2 - 1) = 0 \Rightarrow r^4(r+1)(r-1) = 0$$

$$r = 0, 0, 0, 0, -1, 1$$

$$y_h(t) = c_1 + c_2 t + c_3 t^2 + c_4 t^3 + c_5 e^{-t} + c_6 e^t$$

Since $y(t) = At + B$ is solution to homogeneous equation

$$\text{Try } y(t) = At^5 + Bt^4$$

$$y'(t) = 5At^4 + 4Bt^3, \quad y''(t) = 20At^3 + 12Bt^2$$

$$y'''(t) = 60At^2 + 24Bt, \quad y^{(4)}(t) = 120At + 24B$$

$$y^{(5)}(t) = 120A, \quad y^{(6)}(t) = 0$$

$$-120A + 24B = t \Rightarrow A = -\frac{1}{120}, B = 0$$

$$y(t) = -\frac{1}{120}t^5$$

$$y(t) = c_1 + c_2 t + c_3 t^2 + c_4 t^3 + c_5 e^{-t} + c_6 e^t - \frac{1}{120}t^5$$

High: 20

Low: 11

Average: 16