Math 274 | Quiz 9 | Name: _____

12 July 2017 | Show Appropriate Work | Point Values in boxes.

1. [4] Find the appropriate form using the Method of Undetermined Coeffients for a particular solution to the following. **Do not** solve for the unknown constants.

$r^2+1=0$, $r=\pm i$

(a) $y''+y=(t^3-t)e^{2t}$ $\quad y_p = [At^3+Bt^2+Ct+D]e^{2t}$

(b) $y''+y=t^2\cos t$ $\quad y_p = t[(At^2+Bt+C)\cos t + (Dt^2+Et+F)\sin t]$

2. [6] Use Variation of Parameters with

$$v_1 = \int \frac{-f(t)y_2(t)}{aW[y_1,y_2](t)}\,dt \quad \text{and} \quad v_2 = \int \frac{f(t)y_1(t)}{aW[y_1,y_2](t)}\,dt$$

to find the general solution for

$$y''+y=\sec t.$$

$y_1 = \cos t$, $y_2 = \sin t$

$$W[y_1,y_2] = \begin{vmatrix} \cos t & \sin t \\ -\sin t & \cos t \end{vmatrix} = \cos^2 t + \sin^2 t = 1$$

$$v_1 = \int \frac{-\sec t \cdot \sin t}{1}\,dt = \int -\tan t\,dt = -\ln|\sec t| = \ln|\cos t|$$

$$v_2 = \int \frac{\sec t \cdot \cos t}{1}\,dt = t$$

$$y_p = \cos t \ln|\cos t| + t\sin t$$

$$y = C_1\cos t + C_2\sin t + t\sin t + \cos t \ln|\cos t|$$