Math 274 | MUCs | Name: ____________

Due: 16 Feb 2018 | Show Appropriate Work | Scaled to $\boxed{10}$

1. Find the form of a particular solution suggested by the Method of Undetermined Coefficients.

$y_1 = e^{-t}$

$y_2 = te^{-t}$

solve

$y'' + 2y' + y = 0$

(a) $\boxed{\epsilon}$ $y'' + 2y' + y = 3te^{2t} + 3t^2$ $y_p = (At+B)e^{2t} + (Ct^2+Dt+E)$

$r^2 + 2r + 1 = 0$

$(r+1)^2 = 0$

(b) $\boxed{\epsilon}$ $y'' + 2y' + y = 4t\sin t$ $y_p = (At+B)\cos t + (Ct+D)\sin t$

(c) $\boxed{\epsilon}$ $y'' + 2y' + y = 4te^{-t}$ $y_p = t^2(At+B)e^{-t}$

$y_1 = e^{-t}\cos 3t$

$y_2 = e^{-t}\sin 3t$

solve

$y'' + 2y' + 10y = 0$

(d) $\boxed{\epsilon}$ $y'' + 2y' + 10y = 6e^{-t}\cos 3t$ $y_p = Ate^{-t}\cos 3t + Bte^{-t}\sin 3t$

$(r+1)^2 = -9$

$r = -1 \pm 3i$

2. Find the form of a particular solution suggested by the Method of Undetermined Coefficients in the complex plane.

(a) $\boxed{\epsilon}$ $y'' + 2y' + y = 4te^{it}$ $y_p = (At+B)e^{it}$

$r = -1$

(b) $\boxed{\epsilon}$ $y'' + 2y' + 10y = 6e^{(-1+3i)t}$ $y_p = Ate^{(-1+3i)t}$

$r = -1 \pm 3i$

On separate sheets of paper stapled to this page do the following.

3. Consider the equation

$$y'' + 2y' + y = 4t\sin t. \tag{1}$$

(a) $\boxed{1}$ Find the general solution to $y'' + 2y' + y = 0$.

(b) $\boxed{4}$ Use the Real Method of Undetermined Coefficients to find a particular solution to (1).

(c) $\boxed{4}$ Use the Complex Method of Undetermined Coefficients to find a particular solution to (1).

(d) $\boxed{1}$ Find the general solution to (1).

4. Consider the equation

$$y'' + 2y' + 10y = 6e^{-t}\cos 3t. \tag{2}$$

(a) $\boxed{1}$ Find the general solution to $y'' + 2y' + 10y = 0$.

(b) $\boxed{4}$ Use the Real Method of Undetermined Coefficients to find a particular solution to (2).

(c) $\boxed{4}$ Use the Complex Method of Undetermined Coefficients to find a particular solution to (2).

(d) $\boxed{1}$ Find the general solution to (2).