Math 274 | Quiz 11 | Name: _____

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

1. [4] Find the general solution for the following, assume $t > 0$.

(a) $t^2y'' - ty' + y = 0$

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

$(r-1)^2 = 0 \quad r = 1$

$y = C_1 t + C_2 t \ln t$

(b) $t^2y'' + ty' + 4y = 0$

$r^2 + 4 = 0$

$r = \pm 2i$

$y = C_1 \cos(2\ln t) + C_2 \sin(2\ln t)$

2. [2] Solve the ~~inital~~ initial value problem

$$t^2y'' - 6y = 0, \quad y(1) = 1, \quad y'(1) = 8.$$

$r^2 - r - 6 = (r-3)(r+2) = 0$

$r = 3, \ r = -2$

$y = C_1 t^3 + C_2 t^{-2}$

$y' = 3C_1 t^2 - 2C_2 t^{-3}$

$y(1) = C_1 + C_2 = 1$

$y'(1) = 3C_1 - 2C_2 = 8$

$$\begin{array}{r} 3C_1 - 2C_2 = 8 \\ 2C_1 + 2C_2 = 2 \\ \hline 5C_1 = 10 \end{array}$$

so $C_1 = 2$, $C_2 = -1$

so $y = 2t^3 - t^{-2}$

3. [4] Use the table provided to compute the following Laplace transforms.

(a) $\mathscr{L}\{e^{2t}\sin 3t + 6t^4\}$

$$= \frac{3}{(s-2)^2+9} + 6 \cdot \frac{4!}{s^5}$$

(b) $\mathscr{L}\{8 - 2e^{-t}\cos 7t\}$

$$= \frac{8}{s} - 2 \cdot \frac{s+1}{(s+1)^2+49}$$