# Review Test 2 - MA221 Summer 2009

1. Find the Laplace transform $\mathcal{L}\{f\}$ when:

$$f(t) = \begin{cases} 3 & 0 \le t \le 2 \\ 6 - t & 2 < t \end{cases}$$

2. Determine the Laplace transform of the given function:

$$f(t) = 7e^{2t}\cos 3t - 2e^{7t}\sin 5t$$

3. Solve the given initial value problem using the method of Laplace transforms.

$$y'' + 2y' + 2y = u(t - 2\pi) - u(t - 4\pi) \qquad y(0) = 1 \qquad y'(0) = 1$$

4. Determine the inverse Laplace transform of the given function:

$$\frac{e^{-2s}(4s + 2)}{(s - 1)(s + 2)}$$

5. Determine all the singular points of the given equation and classify them as regular or irregular.

$$(\sin x)y'' + y = 0$$

6. Find a minimum value for the radius of convergence of a power series solution about $x_0$.

$$y'' - (\tan x)y' + y = 0 \qquad x_0 = 0$$

7. Determine the convergence set of the given power series

$$\sum_{n=1}^{\infty} \frac{3}{n^3}(x - 2)^n$$

8. Find a power-series expansion about $x = 0$ for a general solution to the given differential equation. Your answer should include a general formula for the coefficients.

$$y'' - xy' + 4y = 0$$