MA214–03 Fall 2008
Quiz #5 - 10 Points
17 October 2008

NAME: Solutions

1. (6 points). Find the most general solution to the ODE:

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

Find the unique solution to this ODE with the initial conditions: $y(0) = 1$ and $y'(0) = 1$.

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

General Soln.: $\boxed{y(t) = C_1 e^{-t} + C_2 t e^{-t}}$

Initial Cond.: $y'(t) = -C_1 e^{-t} + C_2 e^{-t} - C_2 t e^{-t}$

$y(0) = C_1 = 1$

$y'(0) = -1 + C_2 = 1$ so $C_2 = 2$ $\Big\}$ $\boxed{y(t) = e^{-t}(1+2t)}$.

2. (4 points). Write each of the following complex numbers in the form $x + iy$, with x and y real.

a) 3^{2+i}, *b)* $e^{(\pi/2+i)i}$.

a) $3^{2+i} = 3^2 e^{i\ln 3} = (9\cos(\ln 3)) + i(9\sin(\ln 3))$

b) $e^{(\pi/2+i)i} = e^{\pi/2\, i} e^{-1} = e^{-1}(\cos \pi/2 + i \sin \pi/2) = i e^{-1}$

a) $9\cos(\ln 3) + i(9\sin(\ln 3))$

b) $i e^{-1}$