MA214–03 Spring 2010
Quiz #3 - 10 Points
5 March 2010

NAME: Solutions

1. (7 points). Consider the ODE:

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

a. Find the most general solution to the second-order ODE.

b. Find the unique solution satisfying the initial conditions:

$$y(0) = 1, \quad y'(0) = 0.$$

Characteristic eqn: $r^2 - 2r + 1 = 0$ $\quad b^2 - 4ac = (-2)^2 - 4 = 0$ double root

$-b/2a = 1$ so: $\quad y_1(t) = e^t$ & $y_2(t) = te^t$ 2 independent solns

a) General soln: $\boxed{y(t) = C_1 e^t + C_2 t e^t}$

$y'(t) = C_1 e^t + C_2 e^t + C_2 t e^t$

b.) Unique soln. with $y(0) = 1 = C_1 +$ $\quad$ $C_1 = 1$ & $C_2 = -1$

$y'(0) = 0 = C_1 + C_2$

$\boxed{y(t) = e^t - te^t = (1-t)e^t}$

2. (3 points). Complex algebra:

a. Compute the product: $(2 - 3i)(4 + i)$

b. Find $|z|$, when $z = 2 + 3i$

c. If $z = 1 - i$, find the complex conjugate $\bar{z}$.

a. $(2-3i)(4+i) = 8 - 12i + 2i + 3(-i)(i) = \boxed{11 - 10i}$

b. $|z| = \sqrt{2^2 + 3^2} = \sqrt{13}$.

c. $\bar{z} = 1 + i$.