Quiz 3   Name:_____
Math 2C – Differential Equations
Due Date: Wednesday 19 April

Show all work for full credit. Do work on separate sheets of paper.

1. Solve using variation of parameters. $y'' + 9y = \csc(3x)$

2. A mass weighing 3 lb stretches a spring 3 in. There is no damping and no external forces acting on the system. At $t = 0$ the mass is released 1 inch above the equilibrium position with a downward velocity of 2 ft/sec. Determine the equation of motion.

3. Don correctly solved a spring/mass system and found the equation of motion to be
    $x(t) = 3\cos(\sqrt{2}t) - 4\sin(\sqrt{2}t)$. Use his solution to answer parts a) – d). You may round any numbers to three decimal places if necessary.

    a) Was the mass initially released from above or below equilibrium? Justify briefly.
    b) Convert Don's solution into the form $x(t) = A\sin(\omega t + \phi)$.
    c) What is the greatest displacement of the mass from equilibrium?
    d) At what times is the mass at its greatest displacement <u>below</u> equilibrium?
    e) At what times is the mass passing through equilibrium on the way up.

4. A mass weighing 8 lb stretches a spring 1.5 in. The mass is also attached to a damper with coefficient β. Determine the value of β for which the system is critically damped.