Mathematics 3113-005 Name (please print) _____

Quiz 5 Form B

March 11, 2011

Instructions: Give concise answers, but clearly indicate your reasoning.

I. (3) Define what it means to say that a collection of functions $\{y_1, y_2, \ldots, y_n\}$ is *linearly independent.*

II. (7) Write trial solutions for using the method of undetermined coefficients to find a particular solution of the following DE's, but *do not* carry out the calculations or proceed further with obtaining a particular solution.

(a) $y'' + 9y = e^{3x}$

(b) $y'' - 9y = e^{3x}$

(c) $y^{(4)} + 6y'' + 9y = \cos(3x)$

III. (2) A certain mass-spring system is modeled by the second-order equation $x'' + cx' + 7x = 0$, where c is the damping constant. Find the value of c that gives critical damping (that is, the value of c for which the system neither overdamped nor underdamped).

IV. (3) Suppose that the function $-8\cos(x) - 3\sin(x)$ is rewritten in phase-angle form $C\cos(\omega t - \alpha)$ (do not try to carry this out, just suppose that someone did). Give the phase angle α as an expression that involves a value of the inverse tangent function (that is, as an expression containing a number of the form $\tan^{-1}$(something), not a decimal number. You do not need to evaluate it on a calculator.)