King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 260
Take Home-Test I, Semester II, 2012-2013

Name:_____

ID:_____ Section:_____

1. For each of the following differential equations: identify the dependent and independent variables, give the order and state whether it is linear or nonlinear.

   (a) $x^2y'' + 2xy' + 5y = 0$;

   (b) $x\frac{dx}{dt} + 3t^2 = c$, c is a constant;

   (c) $xdy + ydx = 0$.

2. Verify that $x^2y^4 + x^3 - 27 = 0$ is a solution of $4xy^3\frac{dy}{dx} + 2y^4 + 3x = 0$.

3. Find general solutions of the following differential equations:

   (a) $x \tan y - y' \sec x = 0$;

   (b) $y' \cos x = y \sin x + \sin 2x$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$;

   (c) $ydx - (x + \sqrt{y^2 - xy})dy = 0$;

   (d) $(3x^2 - 2xy + 3y^2)dx = 4xydy$;

   (e) $(ye^{xy} - 2y^3)dx + (xe^{xy} - 6xy^2 - 2y)dy = 0$;

   (f) $2x^3ydx + (x^4 + y^4)dy = 0$, $x > 0$, $y > 0$.

4. For each of the following differential equations: find a suitable substitution and then identify the resulting equation. (DO NOT SOLVE THE RESULT EQUATION AFTER FINDING THE RIGHT SUBSTITUTION)

   (a) $\cos x dx - (\cos y \sin x - y \sin^2 x) dy$;

   (b) $y' = \cos(x + y - 3)$;

   (c) $(2\sqrt{x+y} + 1)dx + (1 - x - y)dy = 0$.