King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math 202 Exam I
Semester II, 2006- (052)
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Name:	
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Sec:	**2** **3**
Serial No:	

Question #		Points
1		30
2		30
3		30
4		30
5		20
6		10
7		15
8		15
9		15
10		15
11		10
Total:		220

1. Solve: $$xy' = 2xe^x - y + 6x^2$$ (#13/page 73)
(Show all your work)

2. Solve: $(3x + y)dy = (x + 3y)dx$ (#7/page 78)
(Show all your work. Hint: it is homog of degree 1)

3. Solve: $y^{\frac{1}{2}}\ y' + y^{\frac{3}{2}} - x^2 = 0$
(Show all your work)

4. Solve: $$(2x + y + 1)y' = 1$$ (#14/page 85)
(Show all your work)

5. Use an appropriate substitution to reduce the DE

$$y' = -x^4 + \frac{2}{x}y + y^2 \tag{1}$$

into a linear DE. Write the new DE in the following form

$$u' + p(x)u = f(x) \tag{2}$$

where $y_1 = x^2$ is a known solution of the DE. [Note: Just reduce it to linear DONOT SOLVE]

6. $y = 2\frac{1+c\ e^{4x}}{1-c\ e^{4x}}$ is a one-parameter family of solutions of the first-order DE $y' = y^2 - 4$. Which one of the following statements is TRUE.

   (a) $y = 2$ is a singular solution
   (b) $y = 2$ is a trivial solution
   (c) $y = 0$ is a trivial solution
   (d) $y = -2$ is a singular solution
   (e) $y = 0$ is a particular solution

7. The DE

$$y^2\ x^{\frac{3}{2}}dx + y^2 x^{\frac{3}{2}}dy = xy^{\frac{9}{2}}dy \tag{3}$$

   is classified as

   (a) separable
   (b) linear in y
   (c) linear in x
   (d) exact
   (e) made exact
   (f) homog. of degree α
   (g) Bernoulli in y
   (h) Bernoulli in x
   (i) $y' = f(Ax + By + C)$
   (j) Riccati in y
   (k) Riccati in x

8. Find an appropriate integrating factor which make the non-exact DE

$$6xydx + (4y + 9x^2) = 0 \tag{4}$$

   an exact DE.

   (a) y^6
   (b) x^2
   (c) y^{-2}
   (d) $12x$
   (e) y^2

9. If $y(x)$ is the solution of the IVP

$$x^2 y' = y(1-x), \qquad y(-1) = -1 \tag{5}$$

Then $y(2) =$ [Note: equation (5) is separable]

(a) $\frac{1}{2}e^{-3/2}$
(b) $-\frac{1}{2}e^{-1/2}$
(c) $\frac{1}{2}e^{3/2}$
(d) 0
(e) $\frac{1}{2}e^{-1/2}$

10. Determine a region of the xy plane for which the differential equation

$$y' = \frac{y^2+4}{x^2-4} \tag{6}$$

would have a unique solution.

(a) $(-4, 4)$
(b) $(0, +\infty)$
(c) $(-\infty, 0)$
(d) $(4, +\infty)$
(e) $(-\infty, 4)$

11. Give an example of an exact linear first-order DE where $y = 2x$ is a particular solution.