

King Fahd University of Petroleum and Minerals
 Department of Mathematical Sciences
 Math 202 Exam I
 Semester II, 2006- (052)
 Dr. Faisal Fairag

Name:	
-------	--

ID:	
-----	--

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

$$y' = -x^4 + \frac{2}{x}y + y^2 \quad (1)$$

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

$$u' + p(x)u = f(x) \quad (2)$$

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

6. $y = 2\frac{1+c}{1-c} \frac{e^{4x}}{e^{4x}}$ 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

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

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

$$6xydx + (4y + 9x^2) = 0 \quad (4)$$

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

$$x^2y' = y(1 - x), \quad y(-1) = -1 \quad (5)$$

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

$$y' = \frac{y^2 + 4}{x^2 - 4} \quad (6)$$

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.