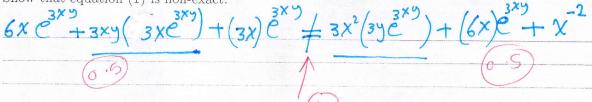
| The Hashemite University De Ordinary Differential Equations (1)                    | First Exar   | n                          | Time: 60 Minutes              |
|--|--|----------------------------|-------------------------------|
| Name (in Arabic): Section number or lecture time:                                  | Student Number:  | Injohnustas                | _ Serial Number:              |
|  |  | _ Instructor               | name:                         |
| Question one Circle the law  |  |                            |                               |
| Question one: Circle the letter t  |  | orrect answer (            | 2 points each).               |
| 1. The differentia equation $yy' = x$  | fraction of the second of the second                                   |                            |                               |
| a. separable b. linear   | homo   | ogeneous                   | d. second order               |
| 2. A general solution to $y' = (3x + y)$   |  |                            |                               |
| a. $tan^{-1}(3x + y) + x = c$<br>c. $tan^{-1}(2x + y) + 3x = c$                    | b. $tan^{-1}(x+y) - tan^{-1}(3x+y)$                                    | 3x = c $(x) - x = c$       |                               |
| 3. If $\frac{dy}{dt} = -\ln(t^y)$ , $y > 0$ with $y(1)$                            |  |                            |                               |
| a. 4   | c. 4e d.   | $\frac{1}{4}e^2$           |                               |
| 4. If $F(x,y) = c$ is a general solution $(2x+4y-2)dx+(y-x-2)dy = c$               | 0 15   |                            |                               |
| a. $F(x-1, y+1) = c$ b $F(x-1, y+1) = c$   | $+1, y-1) = c \qquad c$  | F(x-3,y+2)                 | f(x) = c d. $F(x+3, y-2) = c$ |
| 5. An integrating factor ( of the form   |  |                            |                               |
| (a) $\mu(x,y) = x + \sqrt[2]{y^{-1}}$ b. c. $\mu(x,y) = \sqrt[2]{x^{-1}} + y$ d.   | $\mu(x,y) = x^{-3} + \sqrt[2]{y}$<br>$\mu(x,y) = \sqrt[2]{x^{-3}} + y$ | ,-3<br>-3                  |                               |
| 6. The particular solution of $(\cos x - $<br>condition $y = 1$ when $x = 2\pi$ is | $x\sin x + y^2)dx + 2xy$   | y dy = 0 that              | satisfies the initial         |
| a. $xy^2 - x\cos x = 0$<br>b. $xy^2 + x\cos x = 4\pi$                              | $xy^2 - x\cos x = 2\pi$ $xy^2 + x\cos x = 0$                           |                            |                               |
| Question two: Show that $y^2 + (x^2 + y^2)$  | $+1)y - 3x^3 - 6 = 0$  | is solution for            | the following IVP (3 points)  |
| $2xy^2 - 9x^2$   | $^{2}y + (2y^{2} + x^{2}y + y)$  | $\frac{dy}{dx} = 0,  y(0)$ | ) = -3                        |
| 24y/+ (x2+1)y/+  | (2x)y - 9x2=   | . } (                      |                               |
| (2y+x2+1)y'+   | $-2xy-9x^2$  | =07                        |                               |
| $(2y+x^2+1)y'+$ $(2y^2+x^2y+y)y'$  | $y' + z \times y^2 - 9$  | $x^2y=0$                   | · soly to D.E.                |
| of satisfies I. (onel.: (-3  |  |                            |                               |
|  | 7 -3   | -6 =                       | •                             |

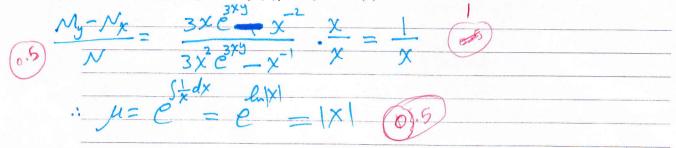
multip by Question three: Consider the following differential equation (4 points)

$$(2e^{3xy} + 3xye^{3xy})dx + (3x^2e^{3xy} - x^{-1})dy = 0$$
(1)

(a) Show that equation (1) is non-exact.



(b) Find an integrating factor  $[\mu(x)]$  of equation (1).



Question four: Find a general solution to the following equation (6 points)

$$\nabla = y^{1-\frac{1}{2}} = y^{5}$$

$$\nabla' = 5y^{4}y'$$

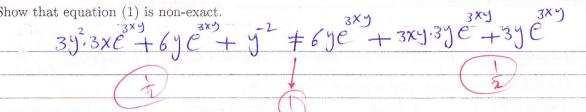
$$\nabla' + V = \frac{1}{e^{2x} + 1}$$

$$V' + V = \frac{1}{e$$

Question three: Consider the following differential equation (4 points)

$$(3y^2e^{3xy} - y^{-1})dx + (2e^{3xy} + 3xye^{3xy})dy = 0$$
(1)

(a) Show that equation (1) is non-exact



(b) Find an integrating factor  $[\mu(y)]$  of equation (1).

$$\frac{N_{\chi}-M_{y}}{M} = \frac{3ye^{3xy}-y^{-2}}{3y^{2}e^{3xy}-y^{-1}} = \frac{1}{y}$$

$$\frac{\int_{y}^{1}dy}{y} = \frac{|y|}{2}$$

$$M = e = e = |y| = \frac{1}{2}$$

Question four: Find a general solution to the following equation (6 points)

| The Hashemite University De Ordinary Differential Equations (1) Name (in Arabic): Section number or lecture time:   | First I<br>Student Numl   | Exam<br>per:                | Time: 1 hour Serial Number      |
|---|---|-----------------------------|---------------------------------|
| Question one: Circle the letter t   | hat represents tl   | ne correct answer           | (2 points each).                |
| 1. The differentia equation $xy'=y$   |   |                             |                                 |
| a. separable b. linear  | c. s  |                             | d homogeneous                   |
| 2. A general solution to $y' = (2x + y)$  | $(x)^2 - 1$ is  |                             | (9)                             |
| a. $tan^{-1}(2x + y) + x = c$<br>C. $tan^{-1}(2x + y) - x = c$  |   | y) - 2x = c $+ y) + 2x = c$ |                                 |
| 3. If $\frac{dy}{dt} = \ln(t^y)$ , $y > 0$ with $y(1) =$  | e, then $y(2) =$  |                             |                                 |
| (a) 4 b. $\frac{1}{4}$  | c. $4e^2$   | d. $\frac{1}{4}e^2$         |                                 |
| 4. If $F(x,y) = c$ is a general solut $(2x+4y+2)dx + (y-x+2)dy =$   | ion to $(2x + 4y = 0)$ is   | )dx + (y - x)dy             | = 0, then a general solution to |
| (a) $F(x-1, y+1) = c$ b. $F(x+1) = c$   | -1, y-1) = c  | c. $F(x+2, y-2)$            | = c d. $F(2x+4y, y-x) = c$      |
| 5. An integrating factor ( of the form a. $\mu(x,y) = x + \sqrt[2]{y^{-1}}$ c. $\mu(x,y) = \sqrt[2]{x^{-1}} + y$ d. | $\mu(x,y) = x^p +$  | $y^q$ ) for $2ydx - xdy$    |                                 |
| 6. The particular solution of $(\cos x - \cos x)$   | $x\sin x + y^2)dx - \frac{1}{2}(x^2 + y^2)dx - \frac{1}$ | $+2xy\ dy=0$ that           | satisfies the initial           |

Question two: Show that  $y^2 + (x^2 + 1)y - 3x^3 - 12 = 0$  is solution for the following IVP (3 points)

 $2xy^{2} - 9x^{2}y + (2y^{2} + x^{2}y + y)\frac{dy}{dx} = 0, \quad y(0) = 3$ 

condition y = 1 when  $x = \pi$  is

a.  $xy^2 - x \cos x = 0$ b.  $xy^2 - x \cos x = 2\pi$ c.  $xy^2 + x \cos x = 4\pi$ b.  $xy^2 - x \cos x = 2\pi$ d)  $xy^2 + x \cos x = 0$ 

| The Hashemite University Ordinary Differential Equations ( Name (in Arabic): Section number or lecture time: _ | 1) First I<br>Student Numb   | Exam                        | October 24, 2012<br>Fime: 1 hour.<br>Serial Number:<br>me: |         |
|--|--|-----------------------------|--|---------|
| Question one: Circle the lett  |  |                             | points each).  |         |
| 1. The differentia equation $x^2y$   | $y' = y^2(\ln x - \ln y),$   | is                          |  |         |
| a. separable bho   | mogeneous  | c. second order             | d. linear  |         |
| 2. A general solution to $y' = (4x)^2$   | $(x^2 + y)^2 - 3$ is   |                             |  |         |
| a $tan^{-1}(4x+y) - x = c$<br>c. $tan^{-1}(5x+y) + 4x = c$   | $h tan^{-1}(x)$  | y) - 4x = c $+ y) + x = c$  |  |         |
| 3. If $\frac{dy}{dt} = \ln(t^y)$ , $y > 0$ with $y(1)$   | $)=e^{2}, \text{ then } y(2)=$                                       |                             |  |         |
| a. 4 b. $\frac{1}{4}$  | © 4e   | 1                           |  |         |
| 4. If $F(x,y) = c$ is a general so $(2x+4y+2)dx+(y-x+5)d$  | 9 0 10   |                             |  |         |
| a. $F(x-1, y+1) = c$ b. $F(x-1, y+1) = c$  | F(x+1,y-1) = c   | F(x-3,y+2) =                | = c d. $F(x+3, y)$   | -2) = c |
| 5. An integrating factor ( of the f  | form $\mu(x,y) = x^p + y$  | $y^q$ ) for $-udx + 2rdy$   | = 0 is   |         |
| a. $\mu(x,y) = x + \sqrt[2]{y^{-1}}$<br>c. $\mu(x,y) = \sqrt[2]{x^{-1}} + y$                                   | b. $\mu(x,y) = x^{-3} + \frac{1}{4}$ d $\mu(x,y) = \sqrt[2]{x^{-3}}$ | $\sqrt[2]{y^{-3}} + y^{-3}$ | <b>- 0 13</b>  |         |
| c m  |  |                             |  |         |

6. The particular solution of  $(\cos x - x \sin x + y^2)dx + 2xy dy = 0$  that satisfies the initial condition y = 2 when  $x = \pi$  is

a. 
$$xy^2 - x \cos x = 2\pi$$
  
c.  $xy^2 - x \cos x = 0$   
b.  $xy^2 + x \cos x = 3\pi$   
d.  $xy^2 + x \cos x = 0$ 

Question two: Show that  $y^2 + (x^2 + 1)y - 3x^3 - 12 = 0$  is solution for the following IVP (3 points)

$$2xy^{2} - 9x^{2}y + (2y^{2} + x^{2}y + y)\frac{dy}{dx} = 0, \quad y(0) = 3$$

| The Hashemite University De Ordinary Differential Equations (1)  Name (in Arabic):  Section number or lecture time: | First Exam   | Time: 60 Minutes. |
|---|--|-------------------|
| Question one: Circle the letter that 1. The differentia equation $y^2y'=x^2$  | $x^2(\ln y - \ln x)$ , is  | (2 points each).  |
| (a) homogeneous b. lin<br>2. A general solution to $y' = (5x + y)$  | 1  | d. second order   |
| a. $tan^{-1}(5x + y) + x = c$<br>c. $tan^{-1}(4x + y) + 5x = c$   | (b) $tan^{-1}(5x + y) - x = c$<br>d. $tan^{-1}(x + y) - 5x = c$                  |                   |
| 3. If $\frac{dy}{dt} = -\ln(t^y)$ , $y > 0$ with $y(1)$   | =e, then $y(2)=$   |                   |
| a. 4 b. $\frac{1}{4}$   | c. $4e$ d) $\frac{1}{4}e^2$  |                   |
| 4. If $F(x,y) = c$ is a general solution $(2x + 4y - 2)dx + (y - x - 5)dy =$  |  |                   |
| a. $F(x-1, y+1) = c$ b. $F(x+1) = c$  | -1, y-1) = c c. $F(x-3, y+2)$  | F(x+3, y-2) = c   |
| 5. An integrating factor ( of the form  | $\mu(x,y) = x^p + y^q$ for $ydx + 2xdy$  | =0 is             |
| a. $\mu(x,y) = x + \sqrt[2]{y^{-1}}$ b. c. $\mu(x,y) = \sqrt[2]{x^{-1}} + y$ d.                                     | $\mu(x,y) = x^{-3} + \sqrt[2]{y^{-3}}$<br>$\mu(x,y) = \sqrt[2]{x^{-3}} + y^{-3}$ |                   |

6. The particular solution of  $(\cos x - x \sin x + y^2)dx + 2xy dy = 0$  that satisfies the initial

Question two: Show that  $y^2 + (x^2 + 1)y - 3x^3 - 6 = 0$  is solution for the following IVP (3 points)

 $2xy^{2} - 9x^{2}y + (2y^{2} + x^{2}y + y)\frac{dy}{dx} = 0, \quad y(0) = -3$ 

condition y = 2 when  $x = 2\pi$  is

(a)  $xy^2 + x \cos x = 10\pi$ c.  $xy^2 + x \cos x = 0$ b.  $xy^2 - x \cos x = 2\pi$ d.  $xy^2 - x \cos x = 0$