King Fahd University of Petroleum & Minerals
Department of Mathematics and Statistics
MATH 301
EXAM I
(part I)
2014-2015 (143)

Sunday, June 21, 2015 **Allowed Time: 1 Hours**

Name: _____

ID Number: _____ Serial Number: _____

Section Number: _____ Instructor's Name: _____

Instructions:

1. Write neatly and legibly. You may lose points for messy work.

2. **Show all your work.** No points for answers without justification.

3. **Calculators and Mobiles are not allowed**.

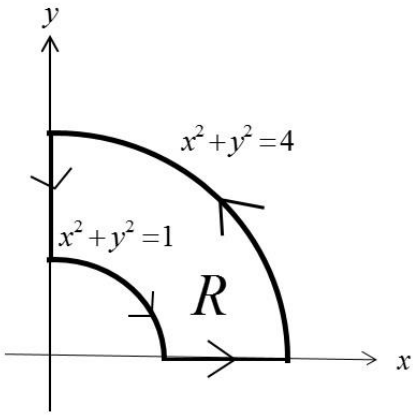
4. Make sure that you have 3 different problems (3 pages + cover page).

Problem No.	Points	Maximum Points
1		**20**
2		**16**
3		**14**
Total:		**50**

1) Use Green's Theorem to find the work done by the force

$$\mathbf{F} = -xy^2\mathbf{i} + x^2y\,\mathbf{j}$$

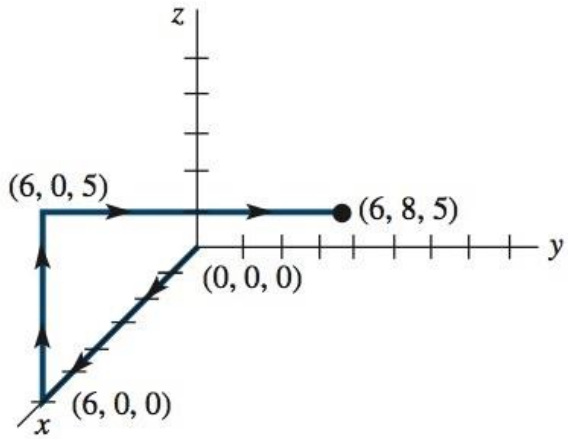
around the given closed curve.



2) Evaluate the line integral

$$\int_C 8y\,dx + 7z\,dy + 7x\,dz$$

on the given curve between (0,0,0) to (6,8,5).



3) Consider the vector field $\mathbf{F} = y\,\mathbf{i} + x\,\mathbf{j}$.

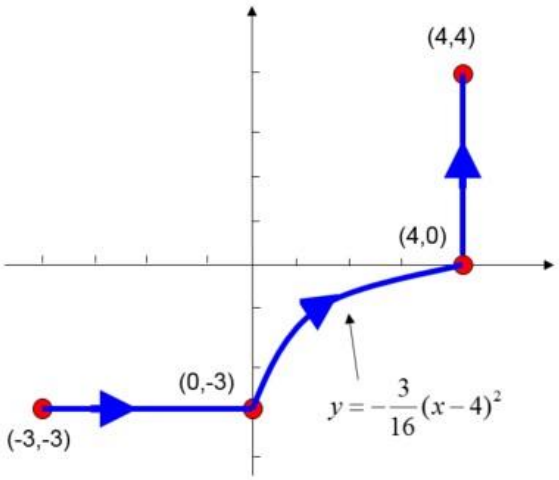
i) Show that F is conservative

ii) Find a potential $\emptyset(x, y)$ whose gradient is the vector field **F**.

iii) Evaluate the line integral

$$\int_C y\,dx + x\,dy$$

along the curve C between $(-3,-3)$ and $(4,4)$.



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Test Information

Description Respondus

Instructions

Multiple Attempts Not allowed. This test can only be taken once.

Question Completion Status:

Save and Submit

QUESTION 1

1. Let F = < 4zy , 5xz , 4xy >
   Find div(curl F)

10 points

QUESTION 2

1. Let F = < 6zy , 6xz , 4xy >
   Find || curl F $|_{(1,2,3)}$ || =

10 points

QUESTION 3

1. Let f = 3zxy / x + 8xz / y + 8xy / z
   Find curl (grad (f)) =

10 points

QUESTION 4

1. Let f = 4zy / x + 3xz / y + 4xy / z
   Find
   $\nabla \cdot (\nabla f)|_{(1,1,1))}$ =

10 points

QUESTION 5

1. Find the directional derivative of
   $f(x,y) = (5xy + 4)^2$
   at the point (2,4) in the direction
   of (4,3)

10 points

QUESTION 6

1. Let g(x,y,z) = xyz then the minimum value of
   D_u g(0,1,-1) is 1

- True
- False

10 points

QUESTION 7

1. The velocity vector field F(x,y,z) = y i + x j + z k
   for a fluid is irrotational

- True
- False

10 points

QUESTION 8

1. The vector field F(x,y) = x i + y j
   is conservative

- True
- False

10 points

QUESTION 9

1. The function ϕ (x,y) = x^2 - y^2
   is a potential function for
   F(x,y) = 2x i + y j

- True
- False

10 points

QUESTION 10

1. Let r(t) be a vector function that satisfies
   r '' (t) = < 0 , -5sin t , -cos t >
   and
   r(0) = (0,0,1)
   and
   r ' (0) = (3,5,0)
   then
   || r(0) || =

10 points

QUESTION 11

1. The parametric curve of
   $(x-1)^2 / 3^2 + (y+2)^2 / 8^2 = 1$
   is
   $x(t) = a \cos t + c$
   $y(t) = b \sin t + d$
   $0 < t < \pi$
   then
   $a + b + c + d =$

10 points

QUESTION 12

1. The arclength of the curve traced by the vector function
   $r(t) = (3\cos t)\, i + (3\sin t)\, j + (7t)\, k$, $0 < t < 2\pi$
   is equal to
   (note: use 4 decimals and $\pi = 3.14159$)

10 points

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

Save and Submit