King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 201-10   Sem II 2004-2005

Final Exam   Wed 8 / 6 / 2005   Time $2\frac{1}{2}$ hours

Name: ______________________   I.D.#:_______________   Serial #:_______

Answer all the questions

Show all of your work

Question #	Grade
1	/ 4
2	/ 4
3	/ 4
4	/ 4
5	/ 4
6	/ 4
7	/ 4
8	/ 4
9	/ 4
10	/ 4
11	/ 4
12	/ 4
13	/ 4
14	/ 4
15	/ 4
16	/ 10
Total	/ 70

1. Let $x \quad 3t^3 \quad 4t^2 \quad 12t \quad 3$, and $y \quad 2t^2 \quad 4t \quad 5$ represents a parametric curve , then find t at which the curve has horizontal tangent.
2. Find equation of the tangent plane to the surface $z \quad 2x^2 \quad y^2$ that is parallel to the plane $x \quad 2y \quad z \quad 3 \quad 0$
3. Determine whether the limit exist or not (show all details)

$$\lim_{x,y \quad 0,0} \frac{xy^2}{x^2 \quad y^4}$$

4. Sketch the two polar curves $r \quad 2\cos 3$, and $r \quad 1$ and give the angles of all points of intersection.
5. Find the distance between the two skew lines
$L_1 : x \quad 2t \quad 1 \quad ,y \quad t \quad 2 \quad ,z \quad 3t \quad 2$
$L_2 : x \quad 3t \quad 3 \quad ,y \quad 2t \quad 2 \quad ,z \quad t \quad 2$
6. Let $z \quad f\, 2x \quad 3y \quad \cos xy$, where f is a differentiable function of x and y. Find $3\frac{z}{x} \quad 2\frac{z}{y}$.
7. Sketch the polar region $r \quad 1 \quad 2\sin$ and find the area inside the smaller loop
8. Find the point of intersection between the line $x \quad t \quad 4 \quad ,y \quad 2t \quad 1 \quad ,z \quad 2t$ and the plane $2x \quad y \quad 3z \quad 3 \quad 0$
9. Find the volume of the solid in the first octant which is between the surfaces $z \quad 4 \quad x^2 \quad y^2$, and $z \quad 3x^2 \quad 3y^2$
10. Find equation of the plane that is perpendicular to the plane $2x \quad 2y \quad z \quad 5 \quad 0$ and containing the line $x \quad t \quad 1 \quad ,y \quad 2t \quad 1 \quad ,z \quad 2t \quad 3$
11. Find the maximum and minimum of the function $f\, x,y \quad y^2 \quad x^2 \quad 2x \quad 4y$ over the closed rectangle with vertices $0,0$, $0, \ 3$, $4,0$, $4, \ 3$.
12. Use polar double integral to evaluate the integral $\underset{Q}{} \sqrt{x^2 \quad y^2}\, dA$, where Q is the region in the first quadrant inside the circle $x^2 \quad y^2 \quad 1$.
13. Use double integral to find the area bounded by the curves $y \quad x^2$, $y \quad 2x \quad 1$, and $y \quad axis$.
14. Let $f\, x,y,z \quad x^2 \ln x \quad y \quad yz^2$, then find the maximum directional derivative of $f\, x,y,z$ at $P\ 3, \ 2,1$
15. Set up the equivalent spherical triple integral that is equivalent to triple integral

$$\overset{1}{\underset{0}{}} \overset{\sqrt{1 \ x^2}}{\underset{\sqrt{1 \ x^2}}{}} \overset{\sqrt{4 \ x^2 \ y^2}}{\underset{\sqrt{1 \ x^2 \ y^2}}{}} \sqrt{x^2 \quad y^2 \quad z^2}\; dz\, dy\, dx$$

16. For each of the following give a short answer in the assigned space:

   a. A normal vector to the plane $2x \quad y \quad 5 \quad 0$ is equal to

   ____

   b. The graph of the polar equation $r \quad 4\cos$ has an equivalent rectangular equation equals to

____

c. The graph of the level surface for $f\ x,y,z\quad 3x^2\quad y^2\quad z^2$ that passes through the point $P\quad 1,2,1$ is called

____

d. The cylindrical surface $z\quad r$ has an equivalent rectangular equation to be

____

e. Let $f\ x,y\quad x\sin\ 2y^2$, then find f_x

____

f. Let the point $P\ \sqrt{2},2$ with rectangular coordinates, then the equivalent polar coordinates ______________________

g. The line $x\quad 2t\quad 1\quad ,y\quad 3t\quad 4\quad ,z\quad 2t\quad 2$ has a parallel vector equals to

____

h. The two vectors $v\quad 1,a,\ 1$, and $u\quad 2,1,\ 1$ are perpendicular if a equals to ______________________

i. $\int_0^2 \int_1^1 6x^2\, dy\, dx$ is equal to

____

j. A unit vector parallel to $b\quad 2,2,\ 1$ is

____

King Fahd University of Petroleum and Minerals
Department of Mathematics

Math 201 - Section 10 Sem II 2004-05

First Major Exam Wed 16 / 3 / 2005 Time $1\frac{1}{4}$ hours

Name: ______________________________ I.D.#: ________________ Serial #: ____

Answer all the questions

Show all of your work

All the questions have equal mark

Question #	1	2	3	4	5	6	7	8	Total
Grade									

1. Find the area of the triangle with vertices $P\ 1,0,\ 1$, $Q\ \ 2,1,0$, and $R\ 0,1,\ 2$.
2. Find the angles at which the the polar curve $r\ \ 1\ \ \cos$ has horizontal tangent line
3. Determine whether the two lines are parallel , intersecting , or skew;
   $L_1 : x\ \ 2\ \ 2t\ \ \ y\ \ 2\ \ t\ \ \ z\ \ \ 2t$, $L_2 : x\ \ 2t\ \ \ y\ \ 1\ \ 2t\ \ \ z\ \ 2\ \ t$
4. Sketch the polar curves $r\ \ 2\cos 2$, and $r\ \ 1$, and find the polar coordinates of all the points of intersection.
5. Find the distance from the point $P\ 0,\ 2,\ 1$ to the line
   $L : x\ \ 2\ \ 2t\ \ \ y\ \ \ 2t\ \ \ z\ \ \ t.$
6. Find the area inside $r\ \ 1\ \ \sin$ and outside $r\ \ 1$
7. Let $\mathbf{u}$ and $\mathbf{v}$ be vectors in 3-space , show that $\mathbf{u}\ \ \mathbf{v}\ \ \frac{1}{4}\ \mathbf{u}\ \ \mathbf{v}\ ^2\ \ \frac{1}{4}\ \mathbf{u}\ \ \mathbf{v}\ ^2$
8. For each of the following give a short answer in the assigned space:

   a. Find a so that the vector $\mathbf{u}\ \ \ 2,2a,a$ is perpendicular to the vector $\mathbf{v}\ \ 3,2,\ 2$

   b. Let $P\ \ 1,\sqrt{3}$ with rectangular coordinates. Find equivalent polar coordinates

   c. Find parametric equations of the line through $P\ 0,2,\ 1$ and parallel to the vector $\mathbf{v}\ \ \ 2,0,3$

   d. Let $\mathbf{a}\ \ \ 1,0,1$, and $\mathbf{b}\ \ 2,1,0$. Find $\mathbf{a}\ \ \mathbf{b}$

e. Give the center and the radius of the sphere with the equation
$x^2 \quad y^2 \quad z^2 \quad 4x \quad 8y \quad 2z \quad 5 \quad 0$

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King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 201 Sem II 2004-2005
Second Major Exam Wed 27 / 4 / 2005 Time $1\frac{1}{4}$ hours

Name: ______________________ I.D.#: _______________ Serial #: ____

Answer all the questions

Show all of your work

Question #	1	2	3	4	5	6	7	Total
Grade	/5	/6	/5	/5	/5	/6	/8	/40

1. Use local linear approximation to estimate the volume of a cylinderical tank with radius $r \quad 3.02.m$, and height $h \quad 4.96\ m$, where $V \quad r^2 h$
2. Find equation of the plane that contains the point $P\ 2, \ 1, 1$ and the line $x \quad 2 \quad t \quad ,y \quad 1 \quad 2t \quad ,z \quad 2t$
3. Determine whether the limit exist or not (show all details)

$$\lim_{x,y,z \quad 0,0,0} \frac{xy \quad xz \quad yz}{x^2 \quad y^2 \quad z^2}$$

4. Sketch the region enclosed by the paraboloid $2z \quad 3 \quad x^2 \quad y^2$, and the cone $x^2 \quad y^2 \quad z^2 \quad 0$, and describe their curve(s) of intersection .
5. Find the distance between the point $P\ 2, 1, \ 1$, and the plane determined by the points $Q\ 1, 0, 2 \quad ,R \quad 1, 1, 0 \quad ,S\ 0, 2, 1$
6. Let $z \quad f\ 3x \quad y \quad xy$, where f is a differentiable function of x and y. Find $\frac{z}{x} \quad 3\frac{z}{y}$
7. For each of the following give a short answer in the assigned space:

a. The normal vector to the plane $x \quad 2y \quad 3z \quad 1 \quad 0$ is equal to

____

b. The graph of the spherical equation $r \quad 4$ has an equivalent rectangular equation equals to

____

c. The level surface for $f\ x,y \quad 3x^2 \quad 2y^2$ that passes through the point $P \quad 1,2$ is

____

d. The quadric surface $x^2 \quad 9y^2 \quad 4z^2 \quad 8z \quad 3 \quad 0$ is called

____

e. Let $f\ x,y,z \quad \sin\ x^2 \quad 2y^2 \quad 4z^2$, then find $\frac{f\ 3,2,1}{z}$

____

f. Let the point $P\ \sqrt{2}, \frac{}{4}, 3$ with cylindrical coordinates then the equivalent

rectangular coordinates are ______________________

and spherical coordinates are______________________

g. If $z \quad f\ x,y \quad 3x^2 \quad xy$, and $x \quad 3t \quad ,y \quad 2t$, then find $\frac{dz}{dt}$ at $t \quad 1$

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Math 201-10 Quize #1B Sem 042

Name:__________________________ I.D.#______________ Serial #_____

Q1: Sketch the graph of the polar curve $r \quad 3 \quad 3\cos$, show the angles where the graph passes through the pole.

Q2:Find the slope of the tangent line to the parametric curve $x \quad t^2$, $y \quad \sin t$ at $t \quad \frac{}{3}$

Q3:Find the angles where the graph $r \quad \cos$, 0 has horizontal tangent.

Math 201-10 Quize #2B Sem 042

Name:________________________ I.D.#____________ Serial #_____

Q1: Find the area inside $r \quad 2\cos$ and outside $r \quad 1$.

Q2:Find the equation of the sphere centered at $2,1,2$ and passes through the origin.

Q3:Find the vectors **u** and **v** in 2-space where $2\mathbf{u} \quad \mathbf{v} \quad \mathbf{2i} \quad \mathbf{3j}$ and $\mathbf{u} \quad \mathbf{3v} \quad \mathbf{i} \quad \mathbf{2j}$

Math 201-10 Quize #2A Sem 042

Name:________________________ I.D.#____________ Serial #_____

Q1: Find the area inside $r \quad 2\sin$ and outside $r \quad 1$.

Q2:Find the equation of the sphere centered at $1,2, \quad 2$ and passes through the origin.

Q3:Find the vectors **u** and **v** in 2-space where $3\mathbf{u} \quad \mathbf{2v} \quad \mathbf{i} \quad \mathbf{2j}$ and $\mathbf{u} \quad \mathbf{3v} \quad \mathbf{2i} \quad \mathbf{j}$

Math 201-10 Quize #3A Sem 042

Name:________________________ I.D.#____________ Serial #_____

Q1: Find equation of the plane that contains the line
$x \quad 2 \quad t \,,\ y \quad 1 \quad 2t \,,\ z \quad 2t$ and the point $P\ 1,0,\ \ 1$

Q2: Identify and sketch the surface $9x^2 \quad 4y^2 \quad 9z^2 \quad 36 \quad 0$

Q3: Find distance between the line $L_1 : x \quad 1 \quad 2t,\ y \quad 1 \quad t \,,\ z \quad 1 \quad 2t$, and the plane $x \quad 4y \quad z \quad 2 \quad 0$.

Q4 Find equivalent spherical coordinates of the point with rectangular coordinates $P\ 2,2,0$

Math 201-10 Quize #4A Sem 042

Name:________________________ I.D.#____________ Serial #_____

Q1: $\lim\limits_{x,y,z \quad 0,0,0} \dfrac{\sin x^2 \ y^2 \ z^2}{x^2 \ y^2 \ z^2}$

Q2: $\lim\limits_{x,y \quad 1,0} \dfrac{y\ x\ 1}{y^2 \quad x\ 1^{\ 2}}$

Q3: Find $\frac{z}{x}$ and $\frac{z}{y}$ by using implicit differentiation : $y^2z \quad \cos\ xyz \quad 0$

Math 201-10 Quize #4B Sem 042

Name:________________________ I.D.#____________ Serial #_____

Q1: $\lim\limits_{x,y,z \quad 0,0,0} \dfrac{\sin\sqrt{x^2 \ y^2 \ z^2}}{\sqrt{x^2 \ y^2 \ z^2}}$

Q2: $\lim\limits_{x,y \quad 0,1} \dfrac{x\ y\ 1}{x^2 \quad y\ 1^{\ 2}}$

Q3: Find $\frac{z}{x}$ and $\frac{z}{y}$ by using implicit differentiation : $x^3z \quad \sin\ xyz \quad 0$

Name: ______________________I.D.#:___________________ Serial #:_______

1. Find all the relative extrema and saddle points(if exist) of the function $f\ x,y \quad 3x \quad x^3 \quad 2y \quad y^2$.
2. Find the absolute extremum of $f\ x,y \quad 2x \quad 2y^2$ over the rectangular region with vertices $0,0$, $1,0$, $0,1$, and $1,1$.
3. Evaluate the double integral $\ {}_R\ 6xy \quad 2y \quad dA$ where R is the rectangle $0,1 \quad 0,2$

Math 201 - 10 Quize #5 B Sem 042

Name: ______________________I.D.#:___________________ Serial #:_______

1. Find all the relative extrema and saddle points(if exist) of the function
$f\ x,y \quad 3y \quad y^3 \quad 2x \quad x^2$

2. Find the absolute extremum of $f\ x,y \quad 2y \quad x^2$ over the rectangular region with vertices $0,0$, $1,0$, $0,1$, and $1,1$.

3. Evaluate the double integral $\ _R\ 6xy \quad 4x \quad dA$ where R is the rectangle
$0,2 \quad 0,1$

Math 201 - 10 Quize #6 B Sem 042

Name: ______________________ I.D.#: ___________________ Serial #: _______

1. Use polar to evaluate the integral $\ _0^{\sqrt{2}}\ _x^{\sqrt{4\ x^2}}\ x^2 \quad y^2 \ \frac{3}{2}\ dy\, dx$.

2. Find the volume of the solid in the first octant bounded by $z \quad 9 \quad y^2$, $z \quad 0$, $x \quad 0$, and $y \quad x$.

3. Express the integral as an equivalent integral with the order of integration reversed
$\ _0^{2}\ _1^{e^y} f\ x,y \quad dx\, dy$

Math 201 - 10 Quize #6 A Sem 042

Name: ______________________ I.D.#: ___________________ Serial #: _______

1. Use polar to evaluate the integral $\ _0^{\sqrt{2}}\ _y^{\sqrt{4\ y^2}}\ x^2 \quad y^2 \ \frac{1}{2}\ dx\, dy$.

2. Find the volume of the solid in the first octant bounded by $z \quad 9 \quad y^2$, $z \quad 0$, $x \quad 0$, and $y \quad x$.

3. Express the integral as an equivalent integral with the order of integration reversed
$\ _1^{e}\ _0^{\ln x} f\ x,y \quad dy\, dx$

Math 201 - 10 Quize #7 A Sem 042

Name: ______________________ I.D.#: ___________________ Serial #: _______

1. Set up the triple integral to find the volume of the solid bounded by the surfaces
$z \quad x^2 \quad y^2$, and $z \quad 2 \quad x^2 \quad y^2$.

2. Evaluate $\ _G\ 6y\, dV$ where G is the region bounded by the surfaces $y \quad x^2$,
$z \quad y \quad 4$, and $z \quad 0$.

3. Express the integral $\ _0^{4}\ _0^{2\ \frac{x}{4}}\ _0^{\frac{x}{2}} f\ x,y,z \quad dy\, dz\, dx$ as integral in the given order
$f\ x,y,z \quad dz\, dy\, dx$ (set up the new limits)

Math 201 - 10 Quize #Make up A Sem 042

Name: ______________________ I.D.#: ___________________ Serial #: _______

1. Set up the rectangular triple integral to find the volume of the solid in the first octant bounded by the surfaces $z \quad 1 \quad y^2$, and $x \quad 2$, $x \quad 0$, $y \quad 0$, and $z \quad 0$.

2. Let $\quad x^2 \quad y^2 \quad z^2 \; dV$ where G is the region below the sphere $x^2 \quad y^2 \quad z^2 \quad 2$

G

and above the paraboloid $z \quad x^2 \quad y^2$,

a. Set up the triple integral by using Cylindrical Coordinates .

b. Set up the integral by using Spherical coordinates