King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 201 Sem II

Final Exam A wednesday 11 / 6 / 2003 Time $2\frac{1}{2}$ hours

Name: ______________________________I.D.#:_______________ Serial #:________

Section #: 6 7

Answer all the question

For the multiple choice questions put your choice in this table

Quistion #	**a**	**b**	**c**	**d**	**e**
1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e

Question #	15	16	17	18	19	20	Total
Grade	/5	/5	/ 4	/ 5	/ 5	/ 4	

1. Let $W \quad \cos\ x^2 \quad y^2 \quad f\, x^2 \quad y^2$, then $x\frac{W}{y} \quad y\frac{W}{x}$ is equal to :

a. 0

b. $4xy \sin\ x^2 \quad y^2$

c. $xy \cos\ x^2 \quad y^2$

d. $4xy \cos\ x^2 \quad y^2$

e. $-2xy \cos\ x^2 \quad y^2\ \sin\ x^2 \quad y^2$

2. The area of the polar region inside $r \quad 2\sin$, and outside $r \quad 1$

a. $\frac{\ }{3} \quad \frac{\sqrt{3}}{2}$

b. $\frac{\ }{2} \quad \frac{1}{2}$

c. $\frac{\ }{2} \quad \frac{\sqrt{3}}{2}$

d. $\frac{\ }{3} \quad \frac{\sqrt{3}}{2}$

e. $\frac{\ }{3} \quad \frac{1}{2}$

3. The volume of the solid Q in the first octant within the cylinder $x^2+y^2=1$ and below the cone $z=\sqrt{x^2+y^2}$ is given by the triple integral:

a. $\int_0^1\int_0^{1-x^2}\int_0^{x^2+y^2} dz\,dy\,dx$

b. $\int_0^1\int_0^{1-x^2}\int_0^{\sqrt{x^2+y^2}} dz\,dy\,dx$

c. $\int_0^1\int_0^{1-x}\int_0^{\sqrt{x^2+y^2}} dz\,dy\,dx$

d. $\int_0^1\int_0^{x}\int_0^{x+y} dz\,dy\,dx$

e. $\int_0^1\int_0^{\sqrt{1-x^2}}\int_0^{\sqrt{x^2+y^2}} dz\,dy\,dx$

4. One of the following is <u>*FALSE*</u>

a. The two vectors $\mathbf{v}=\langle 1,0,\ 1\rangle$, and $\mathbf{u}=\langle 2,1,\ 2\rangle$, are perpendicular.

b. The equation of the surface in cylindrical coordinates $z=r\cos\theta$ is equivalent to the equation , in rectangular coordinates , $z=x$.

c. The equation of the level surface $f(x,y,z)=k$, where $f(x,y,z)=3x^2\ \ y^2\ \ 2z^2$, and $k=\ 1$, is a hyperboloid of two two sheets .

d. $\int_0^1\int_0^2 x\,dy\,dx$

e. The point $P\left(\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}}\right)$ has equivalent polar coordinates as $\left(1,\frac{\pi}{4}\right)$

5. The equation of the tangent plane to the surface $z \quad x^2 \quad \frac{1}{2}y^2$ that is parallel to the plane $2x \quad 2y \quad z \quad 3 \quad 0$ is:

a. $2x \quad 2y \quad z \quad 1 \quad 0$

b. $2x \quad 2y \quad z \quad 7 \quad 0$

c. $2x \quad 2y \quad z \quad 0$

d. $2x \quad 2y \quad z \quad 3 \quad 0$

e. $2x \quad 2y \quad z \quad 5 \quad 0$

6. The directional derivative of $f \; x,y \quad 3x^2 \quad 2xy \quad y^2$ at $P \; 2, \; 1$ in the direction of P to $Q \; 2,2$ is

a. $\frac{32}{3}$

b. 32

c. 0

d. $\frac{62}{5}$

e. 62

7. The distance from the point $P\ \ 3,1,\ \ 2$ *to* the plane $2x\quad y\quad 2z\quad 5\quad 0$ is

a. 0

b. 6

c. 2

d. $\frac{1}{3}$

e. 1

8. One of the following is FALSE

a. The graph of the equation $x\quad y\quad 2z$ is a plane.

b. The graph of the equation $4x^2\quad 2x\quad 4y^2\quad 6y\quad 4z^2\quad\ 12$ is a sphere.

c. The graph of the equation $4x^2\quad 6y^2\quad 3z^2\quad\ 12$ is an ellipsoid.

d. The graph of the equation $z\quad \frac{x^2}{4}\quad \frac{y^2}{4}$ is a hyperbolic paraboloid.

e. The graph of the equation $\ x^2\quad y^2\quad 3z^2\quad\ 0$ is a cone.

9. Let R be the region bounded by the curves $x \quad 2y^2$ and $x \quad y^2 \quad 1$. Then the area of the region R is given by the double integral:

a. $^{1}_{0}\ ^{y^2\ 1}_{2y^2}\ dxdy$

b. $^{1}_{1}\ ^{y^2\ 1}_{0}\ dxdy$

c. $^{1}_{0}\ ^{2y^2}_{y^2\ 1}\ dxdy$

d. $^{1}_{1}\ ^{y^2\ 1}_{0}\ dxdy$

e. $^{1}_{1}\ ^{y^2\ 1}_{2y^2}\ dxdy$

10. The angles at which the polar curve $r \quad 1 \quad \sin$ has horizontal tangent line are

a. $\frac{}{4}, \frac{}{2}, \frac{3}{2}$

b. $\frac{}{6}, \frac{}{4},$

c. $\frac{}{2}, \frac{7}{6}, \frac{11}{6}$

d. $0, \frac{}{2}, \frac{3}{2}$

e. $\frac{}{2}, \frac{4}{3}, \frac{5}{3}$

11. If $w \quad yx^2 \quad 3\sqrt{xy}$, $x \quad t^2 \quad 3$, and $y \quad 2t \quad 1$, then $\dfrac{dw}{dt}$ at $t \quad 1$ is equal to:

a. $\dfrac{81}{2}$

b. 43

c. $\dfrac{21}{2}$

d. 40

e. $\dfrac{35}{2}$

12. The triple integral $\quad_{\sqrt{3}}^{\sqrt{3}} \quad_{\sqrt{3\ x^2}}^{\sqrt{3\ x^2}} \quad_{1}^{\sqrt{4\ x^2\ y^2}} x\,dz\,dy\,dx$

a. $\quad_{0}^{\overline{\ 6\ }} \quad_{0}^{2} \quad_{\sec}^{2} \quad \sin^2 \quad \cos \quad d \quad d \quad d$

b. $\quad_{0}^{\overline{\ 3\ }} \quad_{0}^{2} \quad_{0}^{\sec} \quad {}^2\sin \quad d \quad d \quad d$

c. $\quad_{0}^{\overline{\ 6\ }} \quad_{0}^{2} \quad_{\sec}^{2} \quad {}^2\sin \quad \cos \quad d \quad d \quad d$

d. $\quad_{0}^{\overline{\ 3\ }} \quad_{0}^{2} \quad_{\sec}^{2} \quad {}^3\sin^2 \quad \cos \quad d \quad d \quad d$

e. $\quad_{0}^{\overline{\ 6\ }} \quad_{0}^{2} \quad_{0}^{2} \quad {}^3\sin^2 \quad \cos \quad d \quad d \quad d$

13. The limit $\lim_{x,y,z \quad 0,0,0} \dfrac{xyz}{x^4 \quad y^2 \quad z^2}$

a. equal to $\frac{1}{3}$

b. does not exist

c. equal to $\frac{1}{2}$

d. equal to 1

e. equal to 0

14. $\mathbf{u} \quad \mathbf{v}\ ^2 \quad \mathbf{u} \quad \mathbf{v}\ ^2$ is equal to

a. $2\ \mathbf{u}\ ^2\ \mathbf{v}\ ^2$

b. $\mathbf{u}\ ^2\ \mathbf{v}\ ^2$

c. $1 \quad \mathbf{u}\ ^2\ \mathbf{v}\ ^2$

d. 0

e. $4\ \mathbf{u}\ ^2\ \mathbf{v}\ ^2$

15. Evaluate the double integral $\iint_R y\, dA$, where R is the region in the first quadrant inside the circle $x^2 + y^2 = 1$ and below the line $y = \frac{x}{\sqrt{3}}$

16. Find all relative extrema and saddle points (if exist) of the function $f(x,y) = 4xy - x^4 - y^4$.

17. Sketch the region enclosed by the polar curves $r = 2\cos 3\theta$ and $r = 1$, indicating all points of intersection.

18. Use triple integral to find the volume of the solid in the first quadrant enclosed by the surface $z = 4 - x - y$, and above the $xy-plane$.

19. Find parametric equations for the tangent line to the curve of intersection of the cylinders $x^2 \quad y^2 \quad 25$, and $y^2 \quad z^2 \quad 25$, at the point $3, \quad 4, 3$

20. Find the equation of the plane that contains the line
$L : x \quad 1 \quad t, y \quad 2 \quad t, z \quad 2t$ and perpendicular to the plane: $x \quad 2y \quad 2z \quad 0$