King Fahd University of Petroleum & Minerals
Department of Mathematics and Statistics

Math 201
Final Exam
093
Wednesday, August 25, 2010

EXAM COVER

Number of versions: 4
Number of questions: 20
Number of Answers: 5 per question

This exam was prepared using mcqs
For questions send an email to Dr. Ibrahim Al-Lehyani (iallehyani@kaau.edu.sa)

King Fahd University of Petroleum & Minerals
Department of Mathematics and Statistics

Math 201
Final Exam
093
Wednesday, August 25, 2010
Net Time Allowed: 180 minutes

MASTER VERSION

1. Let L be the tangent line to the curve

$$x = 2\sqrt{t},\ y = e^{-t} \quad \text{at } t = 0.$$

Which of the following is **TRUE**

(a) L contains the point $(3, 1)$

(b) L is parallel to the y-axis

(c) L contains the point $(0, 0)$

(d) L is parallel to the line $y = x$

(e) L contains the point $\left(2, \dfrac{1}{e}\right)$

2. Find the area A of the region that lies inside the curve $r = 10\sin\theta$ and outside the curve $r = 5$.

(a) $A = \dfrac{25\pi}{3} + \dfrac{25\sqrt{3}}{2}$

(b) $A = \dfrac{25\pi}{3}$

(c) $A = \dfrac{25}{3} + \dfrac{25\sqrt{3}}{2}$

(d) $A = \dfrac{25\sqrt{3}}{2}$

(e) $A = \dfrac{3\sqrt{3}}{2}$

3. The vector component of $\vec{u} = \langle 2, 1, 2\rangle$ orthogonal to $\vec{v} = \langle 0, 3, 4\rangle$ is

(a) $\langle 2, -\frac{8}{25}, \frac{6}{25}\rangle$

(b) $\langle 0, \frac{33}{25}, \frac{44}{25}\rangle$

(c) $\langle \frac{22}{25}, \frac{11}{25}, \frac{22}{25}\rangle$

(d) $\langle \frac{28}{25}, \frac{44}{25}, \frac{28}{25}\rangle$

(e) $\langle -\frac{11}{25}, \frac{42}{25}, \frac{66}{25}\rangle$

4. Let L_1 be the line that passes through the point $(0, 1, 2)$ and is parallel to the plane $x+y+z=2$ and perpendicular to the line L_2 given by

$$x = 1+t,\ y = 1-t,\ z = 2t.$$

The symmetric equations of L_1 are given by

(a) $\frac{-x}{3} = y-1 = \frac{z-2}{2}$

(b) $x = 1-y = \frac{z-2}{2}$

(c) $\frac{x}{3} = \frac{y-1}{2} = \frac{z-2}{3}$

(d) $\frac{-x}{3} = \frac{y-1}{2} = z-2$

(e) $-3x = 1-y = \frac{2-z}{2}$

5. Change the order of integration and evaluate the integral
$I = \int_0^2 \int_{\sqrt{\frac{y}{2}}}^1 y\, e^{x^5}\, dx\, dy$

(a) $I = \frac{2}{5}(e-1)$

(b) $I = \frac{1}{10}(e-1)$

(c) $I = e - 1$

(d) $I = \frac{2}{5}\, e$

(e) $I = \frac{2}{5}(e+1)$

6. The quadratic surface represented in spherical coordinates by $5\rho^2 \sin^2\phi - 9\rho^2\cos^2\phi = 4$ is

(a) A hyperboloid of one sheet

(b) An elliptic paraboloid

(c) An elliptic cone

(d) An ellipsoid

(e) A hyperboloid of two sheets

7. If $L = \lim_{(x,y)\to(0,0)} \dfrac{6x^3y}{2x^4+y^4}$, then

(a) L does not exist

(b) $L = 0$

(c) $L = 1$

(d) $L = 2$

(e) $L = 3$

8. The point $P(9, -9, 2)$ is given in rectangular coordinates. Which of the following is a cylindrical coordinate representation of P

(a) $\left(9\sqrt{2}, \dfrac{7\pi}{4}, 2\right)$

(b) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(c) $\left(9\sqrt{2}, 0, 2\right)$

(d) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(e) $\left(-9\sqrt{2}, \frac{\pi}{4}, 2\right)$

9. Suppose that $z = \sin(x)\tan(y)$ where $\begin{array}{c} x = 3s + t \\ y = s - t \end{array}$ then $\left.\left(\dfrac{\partial z}{\partial s} + \dfrac{\partial z}{\partial t}\right)\right|_{\substack{s=\pi/3 \\ t=0}}$ is equal to

(a) $-4\sqrt{3}$

(b) 0

(c) $\dfrac{4\sqrt{3}}{2}$

(d) $\dfrac{\sqrt{3}}{2}$

(e) $\sqrt{3}$

10. The absolute minimum value of $f(x,y) = \dfrac{1}{x} + \dfrac{1}{y}$ on the set $\mathcal{D} = \left\{ (x,y) \middle| \frac{1}{x^2} + \frac{1}{y^2} \leq 1 \right\}$ is

(a) $-\sqrt{2}$

(b) $-2\sqrt{2}$

(c) -2

(d) $\sqrt{2}$

(e) 0

11. The average value of $f(x, y) = e^{x+y}$ over the region R bounded by the triangle with vertices $(0, 0)$, $(0, 1)$, $(1, 1)$ is equal to

(a) $e^2 - 2e + 1$

(b) $\frac{e^2}{2} - e + \frac{1}{2}$

(c) $e^2 + 1$

(d) $e + 1$

(e) $2(e + 1)$

12. If $f(x, y) = e^{2x+3y}(8x^2 - 6xy + 3y^2)$, we have

$$f_{xx}(x, y) = 4e^{2x+3y}(4 + 16x + 8x^2 - 6y - 6xy + 3y^2)$$
$$f_{yy}(x, y) = 3e^{2x+3y}(2 - 12x + 24x^2 + 12y - 18xy + 9y^2)$$
$$f_{xy}(x, y) = 6e^{2x+3y}(-1 + 6x + 8x^2 - y - 6xy + 3y^2)$$

Which one of the following is **TRUE**?

(a) One local minimum and one saddle point

(b) One local maximum and one saddle point

(c) Two saddle points

(d) One local minimum and one local maximum

(e) Two local minima

13. Let R be the rectangle $R = \{(x,y) | 0 \leq x \leq 2,\ \ 0 \leq y \leq 1\}$.
The double integral $\iint\limits_R 6(x^2+y^2)dA$ is equal to

(a) 20

(b) 10

(c) 5

(d) 30

(e) 40

14. Let R be the rectangle $R = \{(x,y) | -1 \leq x \leq 1,\ \ -1 \leq y \leq 1\}$ and $f(x,y) = (1-x^2)(1-y^2)$. If A and B are respectively the absolute maximum and absolute minimum of f on R, then $A+B$ is equal to

(a) 1

(b) 2

(c) 4/3

(d) 3/2

(e) 5

15. The slope of the tangent line to the polar curve $r = \dfrac{3}{1-\sin\theta}$ at the point with polar coordinates $\left(6, \dfrac{\pi}{6}\right)$ is

(a) $\sqrt{3}$

(b) $\dfrac{\sqrt{3}}{2}$

(c) $\dfrac{3}{2}$

(d) $\dfrac{1}{2\sqrt{3}}$

(e) $6\sqrt{3}$

16. An equation of the tangent plane to the level surface $\sqrt{2x^2+y^2+4z^2} = 1$ at the point $\left(\dfrac{1}{2}, \dfrac{1}{2}, \dfrac{1}{4}\right)$ is given by

(a) $\left(x-\frac{1}{2}\right) + \frac{1}{2}\left(y-\frac{1}{2}\right) + \left(z-\frac{1}{4}\right) = 0$

(b) $\left(x-\frac{1}{2}\right) + \left(y-\frac{1}{2}\right) + \left(z-\frac{1}{4}\right) = 0$

(c) $z = \left(x-\frac{1}{2}\right) + \frac{1}{2}\left(y-\frac{1}{2}\right) + \left(z-\frac{1}{4}\right)$

(d) $\frac{1}{2}\left(x-\frac{1}{2}\right) + \frac{1}{2}\left(y-\frac{1}{2}\right) + \frac{1}{4}\left(z-\frac{1}{4}\right) = 0$

(e) $z = \frac{1}{2}\left(x-\frac{1}{2}\right) + \frac{1}{2}\left(y-\frac{1}{2}\right) + \frac{1}{4}\left(z-\frac{1}{4}\right)$

17. In cylindrical coordinates, the integal $\int_{-2}^{2}\int_{0}^{\sqrt{4-y^2}}\int_{0}^{x}(x^2+y^2)dz\;dx\;dy$ is equivalent to

(a) $\int_{-\pi/2}^{\pi/2}\int_{0}^{2}\int_{0}^{r\cos\theta} r^3\;dz\;dr\;d\theta$

(b) $\int_{0}^{2\pi}\int_{0}^{2}\int_{0}^{r\sin\theta} r^3\;dz\;dr\;d\theta$

(c) $\int_{-\pi}^{\pi}\int_{-2}^{2}\int_{0}^{r\cos\theta} r^3\;dz\;dr\;d\theta$

(d) $\int_{0}^{\pi/2}\int_{0}^{2}\int_{0}^{r^2\sin^2\theta} r^2\;dz\;dr\;d\theta$

(e) $\int_{-\pi/2}^{\pi/2}\int_{0}^{2}\int_{0}^{r^2\cos^2\theta} r^2\;dz\;dr\;d\theta$

18. Let R be the region in the first quadrant bounded by the curves $x = 1 - y^2$ and $x^2 + y^2 = 1$. The double integral $\iint_R xy^2\;dA$ is equal to

(a) $\frac{1}{35}$

(b) $\frac{-2}{35}$

(c) $\frac{\sqrt{2}}{7}$

(d) $\frac{1}{5}$

(e) $\frac{1}{7}$

19. Find the volume of the solid bounded by the paraboloid $z = 7 - 6x^2 - 6y^2$ and the plane $z = 1$

(a) 3π

(b) 13π

(c) 4.5π

(d) 2π

(e) 6π

20. The volume V of the region in the first octant in the space inside the sphere $x^2 + y^2 + z^2 = R^2$ and above the cone $3z^2 = x^2 + y^2$ is equal to

(a) $V = \dfrac{\pi R^3}{12}$

(b) $V = \dfrac{3\pi R^2}{8}$

(c) $V = \pi R^3$

(d) $V = \dfrac{R^3}{12}$

(e) $V = \dfrac{\pi R}{12}$

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1. Let L_1 be the line that passes through the point $(0, 1, 2)$ and is parallel to the plane $x+y+z=2$ and perpendicular to the line L_2 given by

$$x = 1 + t,\ \ y = 1 - t,\ \ z = 2t.$$

The symmetric equations of L_1 are given by

(a) $-3x = 1 - y = \dfrac{2-z}{2}$

(b) $\dfrac{-x}{3} = y - 1 = \dfrac{z-2}{2}$

(c) $\dfrac{x}{3} = \dfrac{y-1}{2} = \dfrac{z-2}{3}$

(d) $\dfrac{-x}{3} = \dfrac{y-1}{2} = z - 2$

(e) $x = 1 - y = \dfrac{z-2}{2}$

2. The absolute minimum value of $f(x, y) = \dfrac{1}{x} + \dfrac{1}{y}$ on the set $\mathcal{D} = \left\{ (x, y) \middle| \frac{1}{x^2} + \frac{1}{y^2} \leq 1 \right\}$ is

(a) $-2\sqrt{2}$

(b) -2

(c) 0

(d) $-\sqrt{2}$

(e) $\sqrt{2}$

3. Find the volume of the solid bounded by the paraboloid $z = 7 - 6x^2 - 6y^2$ and the plane $z = 1$

(a) 6π

(b) 3π

(c) 13π

(d) 4.5π

(e) 2π

4. In cylindrical coordinates, the integal $\int_{-2}^{2}\int_{0}^{\sqrt{4-y^2}}\int_{0}^{x}(x^2+y^2)dz\,dx\,dy$ is equivalent to

(a) $\int_{-\pi/2}^{\pi/2}\int_{0}^{2}\int_{0}^{r^2\cos^2\theta} r^2\,dz\,dr\,d\theta$

(b) $\int_{0}^{2\pi}\int_{0}^{2}\int_{0}^{r\sin\theta} r^3\,dz\,dr\,d\theta$

(c) $\int_{0}^{\pi/2}\int_{0}^{2}\int_{0}^{r^2\sin^2\theta} r^2\,dz\,dr\,d\theta$

(d) $\int_{-\pi/2}^{\pi/2}\int_{0}^{2}\int_{0}^{r\cos\theta} r^3\,dz\,dr\,d\theta$

(e) $\int_{-\pi}^{\pi}\int_{-2}^{2}\int_{0}^{r\cos\theta} r^3\,dz\,dr\,d\theta$

5. Find the area A of the region that lies inside the curve $r = 10\sin\theta$ and outside the curve $r = 5$.

(a) $A = \dfrac{25}{3} + \dfrac{25\sqrt{3}}{2}$

(b) $A = \dfrac{3\sqrt{3}}{2}$

(c) $A = \dfrac{25\pi}{3}$

(d) $A = \dfrac{25\sqrt{3}}{2}$

(e) $A = \dfrac{25\pi}{3} + \dfrac{25\sqrt{3}}{2}$

6. The quadratic surface represented in spherical coordinates by $5\rho^2\sin^2\phi - 9\rho^2\cos^2\phi = 4$ is

(a) An ellipsoid

(b) A hyperboloid of two sheets

(c) An elliptic cone

(d) A hyperboloid of one sheet

(e) An elliptic paraboloid

7. The vector component of $\vec{u} = \langle 2, 1, 2\rangle$ orthogonal to $\vec{v} = \langle 0, 3, 4\rangle$ is

(a) $\langle 0, \frac{33}{25}, \frac{44}{25}\rangle$

(b) $\langle 2, -\frac{8}{25}, \frac{6}{25}\rangle$

(c) $\langle \frac{22}{25}, \frac{11}{25}, \frac{22}{25}\rangle$

(d) $\langle -\frac{11}{25}, \frac{42}{25}, \frac{66}{25}\rangle$

(e) $\langle \frac{28}{25}, \frac{44}{25}, \frac{28}{25}\rangle$

8. Suppose that $z = \sin(x)\tan(y)$ where $\begin{matrix} x = 3s + t \\ y = s - t \end{matrix}$ then $\left(\frac{\partial z}{\partial s} + \frac{\partial z}{\partial t}\right)\Big|_{\substack{s=\pi/3 \\ t=0}}$ is equal to

(a) $\frac{4\sqrt{3}}{2}$

(b) $\sqrt{3}$

(c) 0

(d) $\frac{\sqrt{3}}{2}$

(e) $-4\sqrt{3}$

9. An equation of the tangent plane to the level surface $\sqrt{2x^2 + y^2 + 4z^2} = 1$ at the point $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{4}\right)$ is given by

(a) $z = \left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right)$

(b) $\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(c) $\left(x - \frac{1}{2}\right) + \left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(d) $z = \frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right)$

(e) $\frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right) = 0$

10. If $L = \lim\limits_{(x,y)\to(0,0)} \frac{6x^3y}{2x^4 + y^4}$, then

(a) L does not exist

(b) $L = 1$

(c) $L = 3$

(d) $L = 0$

(e) $L = 2$

11. The average value of $f(x, y) = e^{x+y}$ over the region R bounded by the triangle with vertices $(0, 0)$, $(0, 1)$, $(1, 1)$ is equal to

(a) $e + 1$

(b) $e^2 - 2e + 1$

(c) $2(e + 1)$

(d) $e^2 + 1$

(e) $\dfrac{e^2}{2} - e + \dfrac{1}{2}$

12. Let R be the rectangle $R = \{(x, y) | 0 \le x \le 2,\ 0 \le y \le 1\}$. The double integral $\iint\limits_R 6(x^2 + y^2)dA$ is equal to

(a) 20

(b) 5

(c) 10

(d) 30

(e) 40

13. If $f(x,y) = e^{2x+3y}(8x^2 - 6xy + 3y^2)$, we have

$$f_{xx}(x,y) = 4e^{2x+3y}(4 + 16x + 8x^2 - 6y - 6xy + 3y^2)$$
$$f_{yy}(x,y) = 3e^{2x+3y}(2 - 12x + 24x^2 + 12y - 18xy + 9y^2)$$
$$f_{xy}(x,y) = 6e^{2x+3y}(-1 + 6x + 8x^2 - y - 6xy + 3y^2)$$

Which one of the following is **TRUE**?

(a) One local minimum and one local maximum

(b) Two local minima

(c) Two saddle points

(d) One local minimum and one saddle point

(e) One local maximum and one saddle point

14. The point $P(9, -9, 2)$ is given in rectangular coordinates. Which of the following is a cylindrical coordinate representation of P

(a) $\left(9\sqrt{2}, 0, 2\right)$

(b) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(c) $\left(9\sqrt{2}, \frac{7\pi}{4}, 2\right)$

(d) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(e) $\left(-9\sqrt{2}, \frac{\pi}{4}, 2\right)$

15. Let R be the region in the first quadrant bounded by the curves $x = 1 - y^2$ and $x^2 + y^2 = 1$. The double integral $\iint_R xy^2\, dA$ is equal to

(a) $\frac{1}{7}$

(b) $\frac{-2}{35}$

(c) $\frac{1}{5}$

(d) $\frac{1}{35}$

(e) $\frac{\sqrt{2}}{7}$

16. Change the order of integration and evaluate the integral $I = \int_0^2 \int_{\sqrt{\frac{y}{2}}}^1 y\, e^{x^5}\, dx\, dy$

(a) $I = e - 1$

(b) $I = \frac{2}{5}(e-1)$

(c) $I = \frac{1}{10}(e-1)$

(d) $I = \frac{2}{5}(e+1)$

(e) $I = \frac{2}{5}\, e$

17. The volume V of the region in the first octant in the space inside the sphere $x^2 + y^2 + z^2 = R^2$ and above the cone $3z^2 = x^2 + y^2$ is equal to

(a) $V = \dfrac{\pi R}{12}$

(b) $V = \dfrac{\pi R^3}{12}$

(c) $V = \dfrac{R^3}{12}$

(d) $V = \dfrac{3\pi R^2}{8}$

(e) $V = \pi R^3$

18. Let R be the rectangle $R = \left\{(x, y) \middle| -1 \leq x \leq 1, \ -1 \leq y \leq 1\right\}$ and $f(x, y) = (1 - x^2)(1 - y^2)$. If A and B are respectively the absolute maximum and absolute minimum of f on R, then $A + B$ is equal to

(a) 3/2

(b) 1

(c) 5

(d) 2

(e) 4/3

19. The slope of the tangent line to the polar curve $r = \dfrac{3}{1 - \sin\theta}$ at the point with polar coordinates $\left(6, \dfrac{\pi}{6}\right)$ is

(a) $\dfrac{\sqrt{3}}{2}$

(b) $\dfrac{3}{2}$

(c) $6\sqrt{3}$

(d) $\sqrt{3}$

(e) $\dfrac{1}{2\sqrt{3}}$

20. Let L be the tangent line to the curve

$$x = 2\sqrt{t},\ \ y = e^{-t} \ \text{ at } t = 0.$$

Which of the following is **TRUE**

(a) L is parallel to the line $y = x$

(b) L contains the point $\left(2, \dfrac{1}{e}\right)$

(c) L contains the point $(0, 0)$

(d) L contains the point $(3, 1)$

(e) L is parallel to the y-axis

Name ....

ID .... Sec ....

1	a	b	c	d	e	f
2	a	b	c	d	e	f
3	a	b	c	d	e	f
4	a	b	c	d	e	f
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64	a	b	c	d	e	f
65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

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CODE 002 **Math 201** CODE 002

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(a) $\int_0^{2\pi}\int_0^2\int_0^{r\sin\theta} r^3\,dz\,dr\,d\theta$

(b) $\int_{-\pi/2}^{\pi/2}\int_0^2\int_0^{r\cos\theta} r^3\,dz\,dr\,d\theta$

(c) $\int_0^{\pi/2}\int_0^2\int_0^{r^2\sin^2\theta} r^2\,dz\,dr\,d\theta$

(d) $\int_{-\pi/2}^{\pi/2}\int_0^2\int_0^{r^2\cos^2\theta} r^2\,dz\,dr\,d\theta$

(e) $\int_{-\pi}^{\pi}\int_{-2}^2\int_0^{r\cos\theta} r^3\,dz\,dr\,d\theta$

2. If $f(x,y) = e^{2x+3y}(8x^2-6xy+3y^2)$, we have

$$f_{xx}(x,y) = 4e^{2x+3y}(4+16x+8x^2-6y-6xy+3y^2)$$
$$f_{yy}(x,y) = 3e^{2x+3y}(2-12x+24x^2+12y-18xy+9y^2)$$
$$f_{xy}(x,y) = 6e^{2x+3y}(-1+6x+8x^2-y-6xy+3y^2)$$

Which one of the following is **TRUE**?

(a) One local minimum and one saddle point

(b) One local maximum and one saddle point

(c) One local minimum and one local maximum

(d) Two saddle points

(e) Two local minima

3. The absolute minimum value of $f(x,y)=\dfrac{1}{x}+\dfrac{1}{y}$ on the set $\mathcal{D}=\left\{(x,y)\middle|\frac{1}{x^2}+\frac{1}{y^2}\leq 1\right\}$ is

(a) -2

(b) $\sqrt{2}$

(c) $-2\sqrt{2}$

(d) 0

(e) $-\sqrt{2}$

4. Let R be the rectangle $R=\{(x,y)\big|-1\leq x\leq 1,\ \ -1\leq y\leq 1\}$ and $f(x,y)=(1-x^2)(1-y^2)$. If A and B are respectively the absolute maximum and absolute minimum of f on R, then $A+B$ is equal to

(a) 5

(b) $4/3$

(c) 1

(d) $3/2$

(e) 2

5. Find the volume of the solid bounded by the paraboloid $z = 7 - 6x^2 - 6y^2$ and the plane $z = 1$

(a) 6π

(b) 3π

(c) 13π

(d) 2π

(e) 4.5π

6. The quadratic surface represented in spherical coordinates by $5\rho^2 \sin^2 \phi - 9\rho^2 \cos^2 \phi = 4$ is

(a) An elliptic cone

(b) A hyperboloid of two sheets

(c) An elliptic paraboloid

(d) A hyperboloid of one sheet

(e) An ellipsoid

7. The slope of the tangent line to the polar curve $r = \dfrac{3}{1-\sin\theta}$ at the point with polar coordinates $\left(6, \dfrac{\pi}{6}\right)$ is

(a) $\dfrac{3}{2}$

(b) $\dfrac{\sqrt{3}}{2}$

(c) $6\sqrt{3}$

(d) $\sqrt{3}$

(e) $\dfrac{1}{2\sqrt{3}}$

8. Let R be the region in the first quadrant bounded by the curves $x = 1 - y^2$ and $x^2 + y^2 = 1$. The double integral $\displaystyle\iint_R xy^2\, dA$ is equal to

(a) $\dfrac{-2}{35}$

(b) $\dfrac{1}{7}$

(c) $\dfrac{1}{35}$

(d) $\dfrac{\sqrt{2}}{7}$

(e) $\dfrac{1}{5}$

9. An equation of the tangent plane to the level surface $\sqrt{2x^2 + y^2 + 4z^2} = 1$ at the point $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{4}\right)$ is given by

(a) $\frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right) = 0$

(b) $\left(x - \frac{1}{2}\right) + \left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(c) $\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(d) $z = \left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right)$

(e) $z = \frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right)$

10. If $L = \lim_{(x,y)\to(0,0)} \frac{6x^3y}{2x^4 + y^4}$, then

(a) $L = 2$

(b) L does not exist

(c) $L = 1$

(d) $L = 3$

(e) $L = 0$

11. The volume V of the region in the first octant in the space inside the sphere $x^2 + y^2 + z^2 = R^2$ and above the cone $3z^2 = x^2 + y^2$ is equal to

(a) $V = \pi R^3$

(b) $V = \dfrac{\pi R^3}{12}$

(c) $V = \dfrac{R^3}{12}$

(d) $V = \dfrac{\pi R}{12}$

(e) $V = \dfrac{3\pi R^2}{8}$

12. Change the order of integration and evaluate the integral $I = \displaystyle\int_0^2 \int_{\sqrt{\frac{y}{2}}}^1 y\, e^{x^5}\, dx\, dy$

(a) $I = e - 1$

(b) $I = \dfrac{2}{5}(e - 1)$

(c) $I = \dfrac{2}{5}(e + 1)$

(d) $I = \dfrac{2}{5}\, e$

(e) $I = \dfrac{1}{10}(e - 1)$

13. Find the area A of the region that lies inside the curve $r = 10\sin\theta$ and outside the curve $r = 5$.

(a) $A = \dfrac{3\sqrt{3}}{2}$

(b) $A = \dfrac{25\sqrt{3}}{2}$

(c) $A = \dfrac{25\pi}{3} + \dfrac{25\sqrt{3}}{2}$

(d) $A = \dfrac{25\pi}{3}$

(e) $A = \dfrac{25}{3} + \dfrac{25\sqrt{3}}{2}$

14. The point $P(9, -9, 2)$ is given in rectangular coordinates. Which of the following is a cylindrical coordinate representation of P

(a) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(b) $\left(9\sqrt{2}, \frac{7\pi}{4}, 2\right)$

(c) $\left(-9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(d) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(e) $\left(9\sqrt{2}, 0, 2\right)$

15. Let R be the rectangle $R = \{(x, y) \big| 0 \le x \le 2,\ \ 0 \le y \le 1\}$.
The double integral $\displaystyle\iint_R 6(x^2 + y^2)dA$ is equal to

(a) 10

(b) 5

(c) 40

(d) 20

(e) 30

16. Suppose that $z = \sin(x)\tan(y)$ where $\begin{matrix} x = 3s + t \\ y = s - t \end{matrix}$ then
$\left(\dfrac{\partial z}{\partial s} + \dfrac{\partial z}{\partial t}\right)\Bigg|_{\substack{s=\pi/3 \\ t=0}}$ is equal to

(a) $\dfrac{\sqrt{3}}{2}$

(b) $-4\sqrt{3}$

(c) $\dfrac{4\sqrt{3}}{2}$

(d) $\sqrt{3}$

(e) 0

17. The vector component of $\vec{u} = \langle 2, 1, 2\rangle$ orthogonal to $\vec{v} = \langle 0, 3, 4\rangle$ is

(a) $\langle 0, \frac{33}{25}, \frac{44}{25}\rangle$

(b) $\langle \frac{28}{25}, \frac{44}{25}, \frac{28}{25}\rangle$

(c) $\langle -\frac{11}{25}, \frac{42}{25}, \frac{66}{25}\rangle$

(d) $\langle \frac{22}{25}, \frac{11}{25}, \frac{22}{25}\rangle$

(e) $\langle 2, -\frac{8}{25}, \frac{6}{25}\rangle$

18. The average value of $f(x, y) = e^{x+y}$ over the region R bounded by the triangle with vertices $(0, 0)$, $(0, 1)$, $(1, 1)$ is equal to

(a) $2(e + 1)$

(b) $e^2 + 1$

(c) $\frac{e^2}{2} - e + \frac{1}{2}$

(d) $e + 1$

(e) $e^2 - 2e + 1$

19. Let L_1 be the line that passes through the point $(0, 1, 2)$ and is parallel to the plane $x+y+z = 2$ and perpendicular to the line L_2 given by

$$x = 1 + t,\ y = 1 - t,\ z = 2t.$$

The symmetric equations of L_1 are given by

(a) $\dfrac{-x}{3} = \dfrac{y-1}{2} = z - 2$

(b) $x = 1 - y = \dfrac{z-2}{2}$

(c) $\dfrac{x}{3} = \dfrac{y-1}{2} = \dfrac{z-2}{3}$

(d) $\dfrac{-x}{3} = y - 1 = \dfrac{z-2}{2}$

(e) $-3x = 1 - y = \dfrac{2-z}{2}$

20. Let L be the tangent line to the curve

$$x = 2\sqrt{t},\ y = e^{-t} \text{ at } t = 0.$$

Which of the following is **TRUE**

(a) L contains the point $(0, 0)$

(b) L is parallel to the line $y = x$

(c) L contains the point $\left(2, \dfrac{1}{e}\right)$

(d) L is parallel to the y-axis

(e) L contains the point $(3, 1)$

Name ....

ID .... Sec ....

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64	a	b	c	d	e	f
65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

King Fahd University of Petroleum & Minerals
Department of Mathematics and Statistics

CODE 003 **Math 201** CODE 003

Final Exam

093

Wednesday, August 25, 2010

Net Time Allowed: 180 minutes

Name: ____

ID: ____________________ Sec: ____________________.

Check that this exam has 20 questions.

Important Instructions:

1. All types of calculators, pagers or mobile phones are NOT allowed during the examination.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. Find the volume of the solid bounded by the paraboloid $z = 7 - 6x^2 - 6y^2$ and the plane $z = 1$

   (a) 3π

   (b) 13π

   (c) 6π

   (d) 2π

   (e) 4.5π

2. Let R be the region in the first quadrant bounded by the curves $x = 1 - y^2$ and $x^2 + y^2 = 1$. The double integral $\iint_R xy^2 \, dA$ is equal to

   (a) $\dfrac{\sqrt{2}}{7}$

   (b) $\dfrac{-2}{35}$

   (c) $\dfrac{1}{35}$

   (d) $\dfrac{1}{7}$

   (e) $\dfrac{1}{5}$

3. Let L be the tangent line to the curve

$$x = 2\sqrt{t},\ y = e^{-t} \quad \text{at } t = 0.$$

Which of the following is **TRUE**

(a) L is parallel to the y-axis

(b) L contains the point $(3, 1)$

(c) L contains the point $\left(2, \frac{1}{e}\right)$

(d) L contains the point $(0, 0)$

(e) L is parallel to the line $y = x$

4. An equation of the tangent plane to the level surface $\sqrt{2x^2 + y^2 + 4z^2} = 1$ at the point $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{4}\right)$ is given by

(a) $\left(x - \frac{1}{2}\right) + \left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(b) $z = \left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right)$

(c) $\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(d) $\frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right) = 0$

(e) $z = \frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right)$

5. The quadratic surface represented in spherical coordinates by $5\rho^2 \sin^2 \phi - 9\rho^2 \cos^2 \phi = 4$ is

(a) An ellipsoid

(b) A hyperboloid of one sheet

(c) An elliptic paraboloid

(d) A hyperboloid of two sheets

(e) An elliptic cone

6. The vector component of $\vec{u} = \langle 2, 1, 2\rangle$ orthogonal to $\vec{v} = \langle 0, 3, 4\rangle$ is

(a) $\langle -\frac{11}{25}, \frac{42}{25}, \frac{66}{25}\rangle$

(b) $\langle 0, \frac{33}{25}, \frac{44}{25}\rangle$

(c) $\langle \frac{22}{25}, \frac{11}{25}, \frac{22}{25}\rangle$

(d) $\langle 2, -\frac{8}{25}, \frac{6}{25}\rangle$

(e) $\langle \frac{28}{25}, \frac{44}{25}, \frac{28}{25}\rangle$

7. Find the area A of the region that lies inside the curve $r = 10\sin\theta$ and outside the curve $r = 5$.

(a) $A = \dfrac{3\sqrt{3}}{2}$

(b) $A = \dfrac{25}{3} + \dfrac{25\sqrt{3}}{2}$

(c) $A = \dfrac{25\pi}{3}$

(d) $A = \dfrac{25\pi}{3} + \dfrac{25\sqrt{3}}{2}$

(e) $A = \dfrac{25\sqrt{3}}{2}$

8. If $L = \lim\limits_{(x,y)\to(0,0)} \dfrac{6x^3y}{2x^4 + y^4}$, then

(a) $L = 1$

(b) $L = 0$

(c) $L = 2$

(d) L does not exist

(e) $L = 3$

9. In cylindrical coordinates, the integal $\int_{-2}^{2}\int_{0}^{\sqrt{4-y^2}}\int_{0}^{x}(x^2+y^2)dz\,dx\,dy$ is equivalent to

(a) $\int_{0}^{\pi/2}\int_{0}^{2}\int_{0}^{r^2\sin^2\theta} r^2\,dz\,dr\,d\theta$

(b) $\int_{-\pi/2}^{\pi/2}\int_{0}^{2}\int_{0}^{r^2\cos^2\theta} r^2\,dz\,dr\,d\theta$

(c) $\int_{-\pi/2}^{\pi/2}\int_{0}^{2}\int_{0}^{r\cos\theta} r^3\,dz\,dr\,d\theta$

(d) $\int_{0}^{2\pi}\int_{0}^{2}\int_{0}^{r\sin\theta} r^3\,dz\,dr\,d\theta$

(e) $\int_{-\pi}^{\pi}\int_{-2}^{2}\int_{0}^{r\cos\theta} r^3\,dz\,dr\,d\theta$

10. Change the order of integration and evaluate the integral $I=\int_{0}^{2}\int_{\sqrt{\frac{y}{2}}}^{1} y\,e^{x^5}\,dx\,dy$

(a) $I=e-1$

(b) $I=\frac{1}{10}(e-1)$

(c) $I=\frac{2}{5}(e-1)$

(d) $I=\frac{2}{5}e$

(e) $I=\frac{2}{5}(e+1)$

11. Suppose that $z = \sin(x)\tan(y)$ where $\begin{matrix} x = 3s + t \\ y = s - t \end{matrix}$ then $\left.\left(\dfrac{\partial z}{\partial s} + \dfrac{\partial z}{\partial t}\right)\right|_{\substack{s=\pi/3 \\ t=0}}$ is equal to

(a) $-4\sqrt{3}$

(b) 0

(c) $\dfrac{4\sqrt{3}}{2}$

(d) $\dfrac{\sqrt{3}}{2}$

(e) $\sqrt{3}$

12. The slope of the tangent line to the polar curve $r = \dfrac{3}{1 - \sin\theta}$ at the point with polar coordinates $\left(6, \dfrac{\pi}{6}\right)$ is

(a) $6\sqrt{3}$

(b) $\dfrac{1}{2\sqrt{3}}$

(c) $\dfrac{3}{2}$

(d) $\sqrt{3}$

(e) $\dfrac{\sqrt{3}}{2}$

13. The volume V of the region in the first octant in the space inside the sphere $x^2 + y^2 + z^2 = R^2$ and above the cone $3z^2 = x^2 + y^2$ is equal to

(a) $V = \dfrac{3\pi R^2}{8}$

(b) $V = \pi R^3$

(c) $V = \dfrac{\pi R^3}{12}$

(d) $V = \dfrac{R^3}{12}$

(e) $V = \dfrac{\pi R}{12}$

14. The point $P(9, -9, 2)$ is given in rectangular coordinates. Which of the following is a cylindrical coordinate representation of P

(a) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(b) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(c) $\left(-9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(d) $\left(9\sqrt{2}, 0, 2\right)$

(e) $\left(9\sqrt{2}, \frac{7\pi}{4}, 2\right)$

15. The absolute minimum value of $f(x,y) = \dfrac{1}{x} + \dfrac{1}{y}$ on the set $\mathcal{D} = \left\{ (x,y) \middle| \frac{1}{x^2} + \frac{1}{y^2} \leq 1 \right\}$ is

(a) 0

(b) $-\sqrt{2}$

(c) -2

(d) $-2\sqrt{2}$

(e) $\sqrt{2}$

16. Let R be the rectangle $R = \{(x,y) \big| 0 \leq x \leq 2,\ \ 0 \leq y \leq 1\}$. The double integral $\displaystyle\iint_R 6(x^2+y^2)dA$ is equal to

(a) 5

(b) 10

(c) 20

(d) 30

(e) 40

17. Let R be the rectangle $R = \{(x, y) \mid -1 \le x \le 1, \; -1 \le y \le 1\}$ and $f(x, y) = (1 - x^2)(1 - y^2)$. If A and B are respectively the absolute maximum and absolute minimum of f on R, then $A + B$ is equal to

(a) 5

(b) 4/3

(c) 3/2

(d) 2

(e) 1

18. The average value of $f(x, y) = e^{x+y}$ over the region R bounded by the triangle with vertices $(0, 0)$, $(0, 1)$, $(1, 1)$ is equal to

(a) $e^2 - 2e + 1$

(b) $e + 1$

(c) $\frac{e^2}{2} - e + \frac{1}{2}$

(d) $2(e + 1)$

(e) $e^2 + 1$

19. Let L_1 be the line that passes through the point $(0, 1, 2)$ and is parallel to the plane $x + y + z = 2$ and perpendicular to the line L_2 given by

$$x = 1 + t, \ y = 1 - t, \ z = 2t.$$

The symmetric equations of L_1 are given by

(a) $\dfrac{x}{3} = \dfrac{y-1}{2} = \dfrac{z-2}{3}$

(b) $-3x = 1 - y = \dfrac{2-z}{2}$

(c) $x = 1 - y = \dfrac{z-2}{2}$

(d) $\dfrac{-x}{3} = y - 1 = \dfrac{z-2}{2}$

(e) $\dfrac{-x}{3} = \dfrac{y-1}{2} = z - 2$

20. If $f(x, y) = e^{2x+3y}(8x^2 - 6xy + 3y^2)$, we have

$$f_{xx}(x, y) = 4e^{2x+3y}(4 + 16x + 8x^2 - 6y - 6xy + 3y^2)$$
$$f_{yy}(x, y) = 3e^{2x+3y}(2 - 12x + 24x^2 + 12y - 18xy + 9y^2)$$
$$f_{xy}(x, y) = 6e^{2x+3y}(-1 + 6x + 8x^2 - y - 6xy + 3y^2)$$

Which one of the following is **TRUE**?

(a) One local minimum and one saddle point

(b) Two local minima

(c) One local maximum and one saddle point

(d) One local minimum and one local maximum

(e) Two saddle points

Name ....

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59	a	b	c	d	e	f
60	a	b	c	d	e	f
61	a	b	c	d	e	f
62	a	b	c	d	e	f
63	a	b	c	d	e	f
64	a	b	c	d	e	f
65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

King Fahd University of Petroleum & Minerals
Department of Mathematics and Statistics

CODE 004 **Math 201** **CODE 004**

Final Exam

093

Wednesday, August 25, 2010

Net Time Allowed: 180 minutes

Name: ______________________________

ID: ________________ Sec: ________________.

Check that this exam has 20 questions.

Important Instructions:

1. All types of calculators, pagers or mobile phones are NOT allowed during the examination.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. Let L_1 be the line that passes through the point $(0,1,2)$ and is parallel to the plane $x+y+z=2$ and perpendicular to the line L_2 given by

$$x = 1+t,\ \ y = 1-t,\ \ z = 2t.$$

The symmetric equations of L_1 are given by

(a) $\dfrac{-x}{3} = \dfrac{y-1}{2} = z-2$

(b) $\dfrac{-x}{3} = y-1 = \dfrac{z-2}{2}$

(c) $x = 1-y = \dfrac{z-2}{2}$

(d) $-3x = 1-y = \dfrac{2-z}{2}$

(e) $\dfrac{x}{3} = \dfrac{y-1}{2} = \dfrac{z-2}{3}$

2. Let R be the rectangle $R = \{(x,y) | 0 \le x \le 2,\ \ 0 \le y \le 1\}$. The double integral $\iint\limits_R 6(x^2+y^2)dA$ is equal to

(a) 30

(b) 5

(c) 40

(d) 10

(e) 20

3. The vector component of $\vec{u} = \langle 2, 1, 2\rangle$ orthogonal to $\vec{v} = \langle 0, 3, 4\rangle$ is

(a) $\langle \frac{28}{25}, \frac{44}{25}, \frac{28}{25}\rangle$

(b) $\langle 2, -\frac{8}{25}, \frac{6}{25}\rangle$

(c) $\langle \frac{22}{25}, \frac{11}{25}, \frac{22}{25}\rangle$

(d) $\langle -\frac{11}{25}, \frac{42}{25}, \frac{66}{25}\rangle$

(e) $\langle 0, \frac{33}{25}, \frac{44}{25}\rangle$

4. The average value of $f(x, y) = e^{x+y}$ over the region R bounded by the triangle with vertices $(0, 0)$, $(0, 1)$, $(1, 1)$ is equal to

(a) $2(e + 1)$

(b) $e + 1$

(c) $e^2 - 2e + 1$

(d) $e^2 + 1$

(e) $\frac{e^2}{2} - e + \frac{1}{2}$

5. The point $P(9,-9,2)$ is given in rectangular coordinates. Which of the following is a cylindrical coordinate representation of P

(a) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(b) $\left(9\sqrt{2}, \frac{\pi}{4}, 2\right)$

(c) $\left(9\sqrt{2}, \frac{7\pi}{4}, 2\right)$

(d) $\left(9\sqrt{2}, 0, 2\right)$

(e) $\left(-9\sqrt{2}, \frac{\pi}{4}, 2\right)$

6. The absolute minimum value of $f(x,y) = \dfrac{1}{x} + \dfrac{1}{y}$ on the set $\mathcal{D} = \left\{(x,y) \middle| \frac{1}{x^2} + \frac{1}{y^2} \leq 1\right\}$ is

(a) $-2\sqrt{2}$

(b) $\sqrt{2}$

(c) $-\sqrt{2}$

(d) 0

(e) -2

7. Let R be the rectangle $R = \{(x,y) \big| -1 \le x \le 1, \;\; -1 \le y \le 1\}$ and $f(x,y) = (1-x^2)(1-y^2)$. If A and B are respectively the absolute maximum and absolute minimum of f on R, then $A+B$ is equal to

(a) 4/3

(b) 5

(c) 3/2

(d) 2

(e) 1

8. If $L = \displaystyle\lim_{(x,y)\to(0,0)} \frac{6x^3y}{2x^4+y^4}$, then

(a) $L = 0$

(b) $L = 1$

(c) L does not exist

(d) $L = 2$

(e) $L = 3$

9. Suppose that $z = \sin(x)\tan(y)$ where $\begin{array}{c} x = 3s + t \\ y = s - t \end{array}$ then $\left.\left(\dfrac{\partial z}{\partial s} + \dfrac{\partial z}{\partial t}\right)\right|_{\substack{s=\pi/3 \\ t=0}}$ is equal to

(a) $\sqrt{3}$

(b) $\dfrac{4\sqrt{3}}{2}$

(c) $\dfrac{\sqrt{3}}{2}$

(d) 0

(e) $-4\sqrt{3}$

10. Let R be the region in the first quadrant bounded by the curves $x = 1 - y^2$ and $x^2 + y^2 = 1$. The double integral $\iint\limits_R xy^2 \, dA$ is equal to

(a) $\dfrac{\sqrt{2}}{7}$

(b) $\dfrac{1}{5}$

(c) $\dfrac{1}{7}$

(d) $\dfrac{-2}{35}$

(e) $\dfrac{1}{35}$

11. Let L be the tangent line to the curve

$$x = 2\sqrt{t},\ y = e^{-t} \text{ at } t = 0.$$

Which of the following is **TRUE**

(a) L is parallel to the y-axis

(b) L contains the point $\left(2, \frac{1}{e}\right)$

(c) L is parallel to the line $y = x$

(d) L contains the point $(0, 0)$

(e) L contains the point $(3, 1)$

12. The quadratic surface represented in spherical coordinates by $5\rho^2 \sin^2\phi - 9\rho^2 \cos^2\phi = 4$ is

(a) An ellipsoid

(b) A hyperboloid of two sheets

(c) An elliptic cone

(d) A hyperboloid of one sheet

(e) An elliptic paraboloid

13. If $f(x,y) = e^{2x+3y}(8x^2 - 6xy + 3y^2)$, we have

$$f_{xx}(x,y) = 4e^{2x+3y}(4 + 16x + 8x^2 - 6y - 6xy + 3y^2)$$
$$f_{yy}(x,y) = 3e^{2x+3y}(2 - 12x + 24x^2 + 12y - 18xy + 9y^2)$$
$$f_{xy}(x,y) = 6e^{2x+3y}(-1 + 6x + 8x^2 - y - 6xy + 3y^2)$$

Which one of the following is **TRUE**?

(a) One local minimum and one local maximum

(b) One local maximum and one saddle point

(c) Two local minima

(d) Two saddle points

(e) One local minimum and one saddle point

14. The volume V of the region in the first octant in the space inside the sphere $x^2 + y^2 + z^2 = R^2$ and above the cone $3z^2 = x^2 + y^2$ is equal to

(a) $V = \dfrac{R^3}{12}$

(b) $V = \dfrac{\pi R^3}{12}$

(c) $V = \dfrac{3\pi R^2}{8}$

(d) $V = \dfrac{\pi R}{12}$

(e) $V = \pi R^3$

15. Find the volume of the solid bounded by the paraboloid $z = 7 - 6x^2 - 6y^2$ and the plane $z = 1$

(a) 2π

(b) 4.5π

(c) 6π

(d) 13π

(e) 3π

16. The slope of the tangent line to the polar curve $r = \dfrac{3}{1 - \sin\theta}$ at the point with polar coordinates $\left(6, \dfrac{\pi}{6}\right)$ is

(a) $\dfrac{\sqrt{3}}{2}$

(b) $\dfrac{3}{2}$

(c) $\dfrac{1}{2\sqrt{3}}$

(d) $\sqrt{3}$

(e) $6\sqrt{3}$

17. Change the order of integration and evaluate the integral
$$I = \int_0^2 \int_{\sqrt{\frac{y}{2}}}^1 y\, e^{x^5}\, dx\, dy$$

(a) $I = \frac{2}{5}(e+1)$

(b) $I = \frac{1}{10}(e-1)$

(c) $I = e - 1$

(d) $I = \frac{2}{5}(e-1)$

(e) $I = \frac{2}{5}\, e$

18. In cylindrical coordinates, the integal $\int_{-2}^{2} \int_0^{\sqrt{4-y^2}} \int_0^x (x^2+y^2) dz\; dx\; dy$ is equivalent to

(a) $\int_0^{\pi/2} \int_0^2 \int_0^{r^2 \sin^2\theta} r^2\; dz\; dr\; d\theta$

(b) $\int_0^{2\pi} \int_0^2 \int_0^{r \sin\theta} r^3\; dz\; dr\; d\theta$

(c) $\int_{-\pi}^{\pi} \int_{-2}^2 \int_0^{r \cos\theta} r^3\; dz\; dr\; d\theta$

(d) $\int_{-\pi/2}^{\pi/2} \int_0^2 \int_0^{r \cos\theta} r^3\; dz\; dr\; d\theta$

(e) $\int_{-\pi/2}^{\pi/2} \int_0^2 \int_0^{r^2 \cos^2\theta} r^2\; dz\; dr\; d\theta$

19. An equation of the tangent plane to the level surface $\sqrt{2x^2 + y^2 + 4z^2} = 1$ at the point $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{4}\right)$ is given by

(a) $\frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right) = 0$

(b) $\left(x - \frac{1}{2}\right) + \left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(c) $z = \left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right)$

(d) $\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \left(z - \frac{1}{4}\right) = 0$

(e) $z = \frac{1}{2}\left(x - \frac{1}{2}\right) + \frac{1}{2}\left(y - \frac{1}{2}\right) + \frac{1}{4}\left(z - \frac{1}{4}\right)$

20. Find the area A of the region that lies inside the curve $r = 10\sin\theta$ and outside the curve $r = 5$.

(a) $A = \frac{25\sqrt{3}}{2}$

(b) $A = \frac{25\pi}{3}$

(c) $A = \frac{3\sqrt{3}}{2}$

(d) $A = \frac{25}{3} + \frac{25\sqrt{3}}{2}$

(e) $A = \frac{25\pi}{3} + \frac{25\sqrt{3}}{2}$

Name ....

ID .... Sec ....

1	a	b	c	d	e	f	36	a	b	c	d	e	f
2	a	b	c	d	e	f	37	a	b	c	d	e	f
3	a	b	c	d	e	f	38	a	b	c	d	e	f
4	a	b	c	d	e	f	39	a	b	c	d	e	f
5	a	b	c	d	e	f	40	a	b	c	d	e	f
6	a	b	c	d	e	f	41	a	b	c	d	e	f
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33	a	b	c	d	e	f	68	a	b	c	d	e	f
34	a	b	c	d	e	f	69	a	b	c	d	e	f
35	a	b	c	d	e	f	70	a	b	c	d	e	f

Q	MM	V1	V2	V3	V4
1	a	b	b	a	b
2	a	d	a	c	e
3	a	b	e	b	b
4	a	d	c	c	c
5	a	e	b	b	c
6	a	d	d	d	c
7	a	b	d	d	e
8	a	e	c	d	c
9	a	b	c	c	e
10	a	a	b	c	e
11	a	b	b	a	e
12	a	a	b	d	d
13	a	d	c	c	e
14	a	c	b	e	b
15	a	d	d	b	e
16	a	b	b	c	d
17	a	b	e	e	d
18	a	b	e	a	d
19	a	d	d	d	d
20	a	d	e	a	e

Answer Counts

V	a	b	c	d	e
1	8	3	4	0	5
2	7	4	3	4	2
3	3	7	4	3	3
4	3	5	5	4	3