1. The tangent line to the curve of intersection of the surfaces $z = \sqrt{x^2 + y^2}$ and $x - 2y + 2z = 20$ at the point $(4, -3, 5)$ contains the point

(a) $(-12, -16, 0)$ _____ (correct)
(b) $(12, -16, 0)$
(c) $(-12, 16, 0)$
(d) $(12, 16, 0)$
(e) $(16, 12, 0)$

Similar to Exercise # 30 page 937

2. The normal line at the point (e, e, e) to the surface $x \ln(y^2 z) = 3e$ contains the point

(a) $(e-3,\ e-2,\ e-1)$ _____ (correct)
(b) $(e-3,\ e+2,\ e-1)$
(c) $(e-3,\ e-2,\ e+1)$
(d) $(e+3,\ e-2,\ e+1)$
(e) $(e+3,\ e+2,\ e-1)$

Similar to Exercise #26 page 937

3. The function $f(x,y) = 4xy - 4x - 2y^2 + 4y - x^3 - 1$ has

(a) a relative maximum and a saddle point _____(correct)
(b) a relative minimum and a saddle point
(c) two saddle points
(d) two relative extrema
(e) no relative extrema and no saddle points

Similar to Example #3 page # 944

4. If the absolute maximum and the absolute minimum of the function $f(x,y) = x^2 - 2xy + 2y$ over the region $R = \{(x,y)|0 \leq x \leq 3,\ 0 \leq y \leq 2\}$, are M and m respectively, then $M + m =$

(a) 9 _____(correct)
(b) 12
(c) 8
(d) 15
(e) 16

Similar to Exercise # 39 page 947

5. The minimum distance from the point $(6, 6, 0)$ to the surface $z = \sqrt{10 + 6x + 6y}$ is

(a) 8 (correct)
(b) 10
(c) 6
(d) 12
(e) 16

Similar to Exercise # 5 page 953

6. The minimum value of the function $f(x, y) = 3x^2 - y^2$ subject to constraint $2x - 2y + 5 = 0$ is equal to

(a) $-\frac{75}{8}$ (correct)
(b) $-\frac{50}{3}$
(c) $-\frac{25}{4}$
(d) $-\frac{1}{4}$
(e) $-\frac{225}{4}$

Exercise # 98 page 966

7. The maximum value of the function $f(x,y) = 2x^2 + 3y^2 - 4x - 7$ on the disc $x^2 + y^2 \leq 16$ is equal to

(a) 45 (correct)

(b) 43

(c) 41

(d) 39

(e) 37

Similar to Example # 4 page 960

8. $\int_1^{10} \int_0^{\ln y} f(x,y)\, dx\, dy =$

(a) $\int_0^{\ln 10} \int_{e^x}^{10} f(x,y)\, dy\, dx$ (correct)

(b) $\int_0^{\ln 10} \int_0^{e^x} f(x,y)\, dy\, dx$

(c) $\int_0^{\ln y} \int_1^{10} f(x,y)\, dy\, dx$

(d) $\int_0^{\ln 10} \int_1^{10} f(x,y)\, dy\, dx$

(e) $\int_0^{10} \int_0^{\ln x} f(x,y)\, dy\, dx$

Exercise # 47 page 976

9. $\int_0^2 \int_{y^2}^4 \sqrt{x} \sin x \, dx \, dy =$

(a) $-4\cos(4) + \sin(4)$ (correct)

(b) $4\cos(4) - \sin(4)$

(c) $2\cos(2) + \sin(2)$

(d) $2\cos(2) - \sin(2)$

(e) $\cos(4) - 4\sin(4)$

Exercise # 66

page 977

10. $\int_0^1 \int_y^1 \cos(x^2) \, dx \, dy =$

(a) $\frac{\sin(1)}{2}$ (correc)

(b) $\frac{\cos(1)}{2}$

(c) $\frac{1}{2}$

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

(e) 0

Similar to

Exercise # 49

page 988

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

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

(b) $e-1$

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

(d) $e+1$

(e) e^2-2

Exercise # 55

page 988

12. The volume of the solid bounded by the graphs of $z = \sqrt{x^2+y^2}$, $z = 0$ and $x^2+y^2 = 25$ is equal to

(a) $\frac{250\pi}{3}$ (correct)

(b) $\frac{125\pi}{3}$

(c) $\frac{75\pi}{3}$

(d) $\frac{50\pi}{3}$

(e) $\frac{200\pi}{3}$

Exercise # 35

page 996

13. Let $I = \int_0^2 \int_0^x \sqrt{x^2+y^2}\, dy\, dx + \int_2^{2\sqrt{2}} \int_0^{\sqrt{8-x^2}} \sqrt{x^2+y^2}\, dy\, dx.$

After writing I as a single iterated integral by converting to polar coordinates, $I =$

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

(b) $\frac{2\sqrt{2}\pi}{3}$

(c) $\frac{\sqrt{2}\pi}{3}$

(d) $\frac{8\sqrt{2}\pi}{3}$

(e) $\frac{16\sqrt{2}\pi}{3}$

Exercise #27
page 995

14. $\int_1^4 \int_0^1 \int_0^x 2ze^{-x^2}\, dy\, dx\, dz =$

(a) $\frac{15(1-e^{-1})}{2}$ _____(correc)

(b) $8(1-e^{-1})$

(c) $\frac{7(1-e^{-1})}{3}$

(d) $\frac{e^{-1}-1}{3}$

(e) $\frac{9(e^{-1}-1)}{2}$

Exercise # 7
page 1021

15. The volume of the solid in the first octant bounded by the coordinate planes and the plane $z = 7 - x - 2y$ is given by

(a) $\int_0^7 \int_0^{\frac{7-x}{2}} \int_0^{7-x-2y} dz\,dy\,dx$ _____(correct)

(b) $\int_0^7 \int_0^{\frac{7}{2}} \int_0^{7-x-2y} dz\,dy\,dx$

(c) $\int_0^7 \int_0^{\frac{7}{2}} \int_0^{7} dz\,dy\,dx$

(d) $\int_0^7 \int_0^{7-x} \int_0^{7-x-2y} dz\,dy\,dx$

(e) $\int_0^{\frac{7}{2}} \int_0^{7-2y} \int_0^{7-x-2y} dz\,dy\,dx$

Exercise #13
page 1021

16. The rectangular equation $x^2 + y^2 + z^2 - 3z = 0$ in spherical coordinates is

(a) $\rho = 3\cos\phi$ _____(correct)

(b) $\rho = 3\sin\phi$

(c) $\rho = \sqrt{3}\cos\phi$

(d) $\rho = \sqrt{3}\sin\phi$

(e) $\rho = \sqrt{3}$

Similar to
Example #5(b), Exercise #81
page 812, page 814
respectively.

17. An equation in rectangular coordinates for the surface represented by the cylindrical equation $r^2 \cos 2\theta - z^2 + 1 = 0$ is

(a) $-x^2 + y^2 + z^2 = 1$ (correct)
(b) $x^2 - y^2 - z^2 = 1$
(c) $x^2 - y^2 + z^2 = 1$
(d) $x^2 + y^2 + z^2 = 1$
(e) $x^2 + y^2 - z^2 = 1$

Similar to Example #4 page 810

18. Using cylindrical coordinates, we find that

$$\int_0^4 \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_{x^2+y^2}^{16} y \, dz dy dx =$$

(a) 0 (correct)
(b) 4π
(c) 2π
(d) 8π
(e) 16π

Similar to Exercise #41 page 1030

19. In spherical coordinates, the integral

$$\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}}\int_{1-\sqrt{1-x^2-y^2}}^{1+\sqrt{1-x^2-y^2}} (x^2+y^2+z^2)^{\frac{3}{2}}\, dzdydx$$

is equal to

(a) $\int_0^{2\pi}\int_0^{\frac{\pi}{2}}\int_0^{2\cos\phi} \rho^5 \sin\phi d\rho d\phi d\theta$ _____(correct)

(b) $\int_0^{2\pi}\int_0^{\pi}\int_0^{2\cos\phi} \rho^5 \sin\phi d\rho d\phi d\theta$

(c) $\int_0^{2\pi}\int_0^{\frac{\pi}{2}}\int_0^{\cos\phi} \rho^5 \sin\phi d\rho d\phi d\theta$

(d) $\int_0^{2\pi}\int_0^{\frac{\pi}{2}}\int_0^{2\cos\phi} \rho^4 \sin\phi d\rho d\phi d\theta$

(e) $\int_0^{2\pi}\int_0^{\pi}\int_0^{2\cos\phi} \rho^4 \sin\phi d\rho d\phi d\theta$

Similar to Exercise #43 page 1030

20. The volume of the solid that lies within the sphere $x^2+y^2+z^2=4$, above the xy-plane and below the cone $z=\sqrt{x^2+y^2}$ is equal to

(a) $\frac{8\sqrt{2}\pi}{3}$ _____(correct)

(b) $\frac{\sqrt{2}\pi}{3}$

(c) $\frac{8\pi}{3}$

(d) $\frac{5\sqrt{3}\pi}{2}$

(e) $\frac{\sqrt{3}\pi}{3}$

Exercise #31 page 1030

21. If the slope of the tangent line to the parametric curve $x = 3t^2 + 1$, $y = t^3 - 1$ at the point (a, b) is equal to $\frac{1}{2}$, then $a + b =$

(a) 4 (correct)
(b) 1
(c) -1
(d) $\frac{1}{2}$
(e) 0

Similar to Example #2 page 711

22. The area of the region enclosed by the polar curve $r = 4\cos\theta$ is equal to

(a) 4π (correct)
(b) 8π
(c) 6π
(d) 2π
(e) π

Similar to Example #1 page 730

23. The projection of the vector $\vec{u} =< 0, 3, 3 >$ onto the vector $\vec{v} =< -1, 1, 1 >$ is

(a) $< -2, 2, 2 >$ (correct)
(b) $< -2, -2, 2 >$
(c) $< -2, 2, -2 >$
(d) $< 2, 2, -2 >$
(e) $< 2, 2, 2 >$

Exercise #41
page 777

24. If the area of a triangle with vertices $(2, -1, -2)$, $(3, 1, -2)$ and $(3, a, 0)$ is equal to 3, then the product of all possible values of a is

(a) -15 (correct)
(b) 15
(c) 9
(d) -9
(e) 6

Similar to
Exercises 25, 26
page 785

25. Suppose that the equation of the plane that passes through the point $(2, 2, 1)$ and contains the line $\frac{x}{2} = \frac{y-4}{-1} = z$ is given by $ax + by - 2z = 0$. Then $a + b =$

(a) 1 _____(correct)

(b) 0

(c) 3

(d) -3

(e) -6

Exercise #52
page 795

26. $\lim_{(x,y)\to(0,0)} \frac{x^4}{x^4 + y^2} =$

(a) does not exist _____(correct)

(b) 0

(c) 1

(d) -1

(e) $\frac{1}{2}$

Typical limit exercise
similar to
Exercise # 16
page 964

27. If $f(x, y, z) = z\sin(xy^2 + 2z)$, then $\dfrac{\partial f}{\partial z}(1, -1, -1) =$

(a) $-2\cos(1) - \sin(1)$ (correct)

(b) $-2\cos(1) + \sin(1)$

(c) $2\cos(1) - \sin(1)$

(d) $2\cos(1) + \sin(1)$

(e) $2\cos(1) - 2\sin(1)$

Example #6
page 898

28. If $z = e^{xy}$, $x = 3s + t$ and $y = 3s - t$, then the value of $\dfrac{\partial z}{\partial s}$ when $s = \dfrac{1}{3}$ and $t = 1$ is equal to

(a) 6 (correct)

(b) 9

(c) 18

(d) 3

(e) 12

Similar to
Example #5
page 915

Math 201, 223, Final Exam

Answer KEY

Q	MASTER	CODE01	CODE02	CODE03	CODE04
1	A	C 19	D 12	C 6	A 18
2	A	D 20	B 10	A 18	B 13
3	A	C 22	B 24	E 4	A 14
4	A	D 14	C 25	E 22	D 17
5	A	A 3	E 19	E 7	D 23
6	A	E 17	C 28	B 5	D 9
7	A	B 9	B 18	C 28	B 8
8	A	E 10	D 9	A 2	D 1
9	A	A 5	E 1	E 19	E 10
10	A	A 26	B 14	C 1	C 11
11	A	D 11	A 23	B 15	D 3
12	A	B 21	E 4	A 10	E 6
13	A	E 23	B 16	B 26	A 2
14	A	C 2	C 27	B 23	E 20
15	A	C 24	A 21	C 16	D 5
16	A	B 27	A 2	B 24	E 27
17	A	E 7	D 20	C 12	E 12
18	A	D 1	D 5	C 25	A 22
19	A	D 25	D 8	B 14	D 15
20	A	B 13	D 7	D 17	E 4
21	A	D 28	D 26	C 20	A 26
22	A	B 4	D 3	D 8	E 16
23	A	B 8	D 22	A 9	D 24
24	A	D 6	E 6	D 11	A 7
25	A	D 15	E 11	C 13	E 19
26	A	D 18	C 13	E 27	C 25
27	A	B 12	C 17	A 21	E 21
28	A	C 16	E 15	D 3	E 28