---

21. (1 point) `Library/UMN/calculusStewartET/s_15_3_17.pg`
Evaluate the double integral $\iint_D x\cos y\,dA$, where D is bounded by $y=0$, $y=x^2$, and $x=5$.
Answer: ________

---

22. (1 point) `Library/UMN/calculusStewartET/s_15_7_4.pg`
Evaluate the iterated integral $\int_0^1\int_x^{9x}\int_0^y 9xyz\,dz\,dy\,dx$.
Answer: ________

---

23. (1 point) `Library/UMN/calculusStewartET/s_15_7_18.pg`
Evaluate the triple integral $\iiint_E z\,dV$, where E is bounded by the cylinder $y^2+z^2=16$ and the planes $x=0$, $y=4x$, and $z=0$ in the first octant.
Answer: ________

---

24. (1 point) `Library/UMN/calculusStewartET/s_15_7_7.pg`
Evaluate the iterated integral $\int_0^{\pi/6}\int_0^y\int_0^x \cos(x+y+z)\,dz\,dx\,dy$.
Answer: ________

---

26. (1 point) `Library/UMN/calculusStewartET/s_15_4_5.pg`
Sketch the region whose area is given by the integral and evaluate it.

$$\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}}\int_2^5 r\,dr\,d\theta$$

Answer: ________

---

27. (1 point) `Library/UMN/calculusStewartET/s_15_2_26.pg`
Find the volume of the solid that lies under the hyperbolic paraboloid $z=3y^2-x^2+4$ and above the rectangle $R=[-1,1]\times[1,2]$.
Answer: ________

---

29. (1 point) `Library/UMN/calculusStewartET/s_15_3_22.pg`
Evaluate the double integral $\iint_D 6xy\,dA$, where D is the triangular region with vertices $(0,0)$, $(1,2)$, and $(0,3)$.
Answer: ________

---

33. (1 point) `Library/UMN/calculusStewartET/s_15_4_20.pg`
Use polar coordinates to find the volume of the solid below the paraboloid $z=100-4x^2-4y^2$ and above the xy-plane.
Answer: ________

---

37. (1 point) `Library/UMN/calculusStewartET/s_15_4_12.pg`
Evaluate the double integral $\iint_D \cos\sqrt{x^2+y^2}\,dA$, where D is the disc with center the origin and radius 2, by changing to polar coordinates.
Answer: ________

---

40. (1 point) `Library/UMN/calculusStewartET/s_15_3_18.pg`
Evaluate the double integral $\iint_D \left(x^2+4y\right)\,dA$, where D is bounded by $y=x$, $y=x^3$, and $x\ge 0$.
Answer: ________

41. **(1 point)** `Library/UMN/calculusStewartET/s_15_7_20.pg`
Use a triple integral to find the volume of the solid enclosed by the paraboloids $y = x^2 + z^2$ and $y = 72 - x^2 - z^2$.
Answer: ________

42. **(1 point)** `Library/UMN/calculusStewartET/s_15_4_6.pg`
Sketch the region whose area is given by the integral and evaluate it.

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

Answer: ________

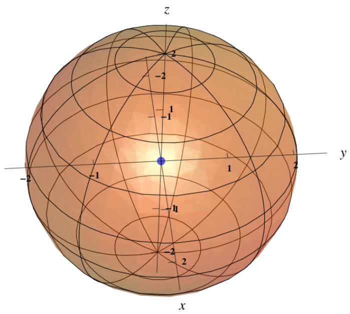
43. **(1 point)** `Library/UMN/calculusStewartET/s_15_4_prob01.pg`
Use a double integral to find the area of the cardioid $r = 5 - 5\cos\theta$.
Answer: ________

46. **(1 point)** `Library/UMN/calculusStewartET/s_15_3_6.pg`
Evaluate the iterated integral $\displaystyle\int_0^5 \int_0^{e^v} \sqrt{1+e^v}\,dw\,dv$.
Answer: ________

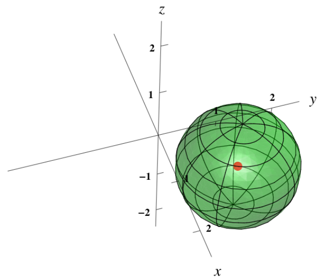
53. **(1 point)** `Library/UMN/calculusStewartET/s_15_4_15.pg`
Use a double integral to find the area of one loop of the rose $r = 6\cos(3\theta)$.
Answer: ________

55. **(1 point)** `Library/UMN/calculusStewartET/s_15_2_35.pg`
Find the average value of $f(x,y) = x^2y$ over the rectangle R with vertices $(-2,0),(-2,8),(2,8),(2,0)$.
Answer: ________

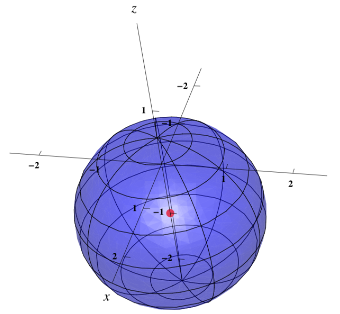
56. **(1 point)** `Library/UMN/calculusStewartET/s_12_1_prob01/s_12_1_prob01.pg`
Match the equations of the spheres with one of the graphs below.



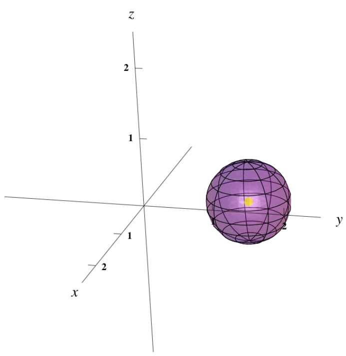
A



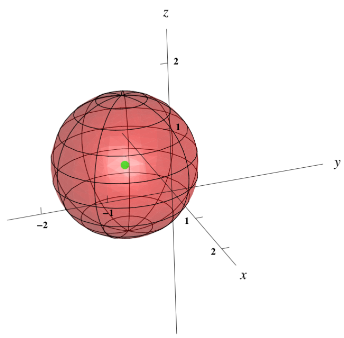
B



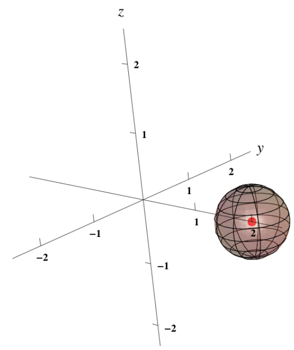
C



D



E



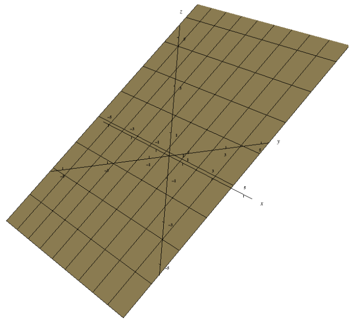
F

___ 1. $x^2+y^2+(z+1)^2=\frac{9}{4}$
___ 2. $x^2-4x+y^2+z^2=-\frac{15}{4}$
___ 3. $x^2-2x+y^2+2y+z^2-2z=-2$
___ 4. $(x-1)^2+(y-1)^2+z^2=1$

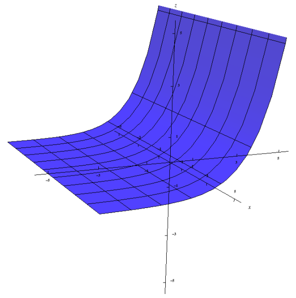
Note: *You can click on the graphs to enlarge the images.*

---

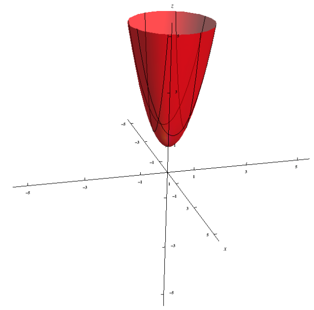
58. **(1 point)** `Library/UMN/calculusStewartET/s_14_1_23/s_14_1_23.pg`
Match each function with one of the graphs below.



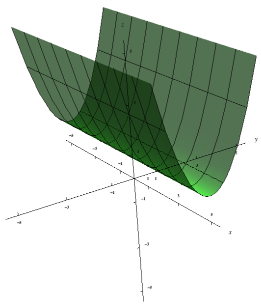
A



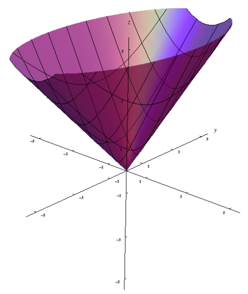
B



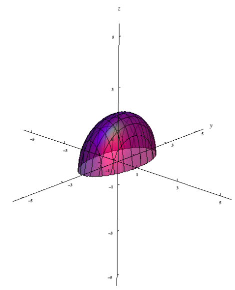
C



D



E



F

___ 1. $f(x,y) = 1 + 2x^2 + 2y^2$
___ 2. $f(x,y) = y^2 + 1$
___ 3. $f(x,y) = \sqrt{4 - 4x^2 - y^2}$
___ 4. $f(x,y) = 1 + y$

Note: *You can click on the graphs to enlarge the images.*

---

59. **(1 point)** `Library/Rochester/setVMultIntegrals2Polar/UR_VC_9_4.pg`

A cylindrical drill with radius 2 is used to bore a hole through the center of a sphere of radius 3. Find the volume of the ring shaped solid that remains.

____

---

61. **(1 point)** `Library/Rochester/setIntegrals24Centroid/centroid6_5.1.pg`
Find the centroid $(\bar{x}, \bar{y})$ of the region bounded by:

$$y = 5x^2 + 4x, \quad y = 0, \quad x = 0, \quad \text{and} \quad x = 4.$$

$\bar{x}$= ______________
$\bar{y}$= ______________

62. **(1 point)** `Library/Rochester/setIntegrals24Centroid/ur_in_24_1.pg`

The masses m_i are located at the points P_i. Find the center of mass of the system.
$m_1 = 7, m_2 = 8, m_3 = 3.$
$P_1 = (8,-3), P_2 = (3,-5), P_3 = (3,-7).$
$\bar{x}=$ ____________
$\bar{y}=$ ____________

---

64. **(1 point)** `Library/Rochester/setVMultIntegrals1Double/ur_vc_8_14.pg`

If $\int_{-1}^{2} f(x)\,dx = -1$ and $\int_{2}^{4} g(x)\,dx = -4$, what is the value of $\iint_D f(x)g(y)\,dA$ where D is the square: $-1 \le x \le 2,\ \ 2 \le y \le 4$?

____

---

65. **(1 point)** `Library/Rochester/setVMultIntegrals1Double/ur_vc_8_13.pg`

Match the following integrals with the verbal descriptions of the solids whose volumes they give. Put the letter of the verbal description to the left of the corresponding integral.

___1. $\int_0^1 \int_{y^2}^{\sqrt{y}} 4x^2 + 3y^2\,dxdy$
___2. $\int_{-2}^{2} \int_4^{4+\sqrt{4-x^2}} 4x + 3y\,dydx$
___3. $\int_0^2 \int_{-2}^{2} \sqrt{4-y^2}\,dydx$
___4. $\int_{-1}^{1} \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} 1 - x^2 - y^2\,dydx$
___5. $\int_0^{\frac{1}{\sqrt{3}}} \int_0^{\frac{1}{2}\sqrt{1-3y^2}} \sqrt{1-4x^2-3y^2}\,dxdy$

A. One half of a cylindrical rod.
B. Solid under an elliptic paraboloid and over a planar region bounded by two parabolas.
C. Solid under a plane and over one half of a circular disk.
D. One eighth of an ellipsoid.
E. Solid bounded by a circular paraboloid and a plane.

---

67. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_5.pg`

What are the spherical coordinates of the point whose rectangular coordinates are
$(1,\ 3,\ -3)$?

$\rho =$ ________________
$\theta =$ ________________
$\phi =$ ________________

---

68. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_4.pg`

What are the rectangular coordinates of the point whose spherical coordinates are
$\left(3, -\frac{1}{2}\pi, 0\pi\right)$?

$x =$ ________________
$y =$________________

$z =$ ____________________

---

69. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_7.pg`
Match the given equation with the verbal description of the surface:

A. Elliptic or Circular Paraboloid
B. Plane
C. Sphere
D. Half plane
E. Circular Cylinder
F. Cone

___1. $\phi = \frac{\pi}{3}$
___2. $r = 4$
___3. $\rho = 4$
___4. $\theta = \frac{\pi}{3}$
___5. $\rho = 2\cos(\phi)$
___6. $r = 2\cos(\theta)$
___7. $r^2 + z^2 = 16$
___8. $z = r^2$
___9. $\rho\cos(\phi) = 4$

---

70. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_3.pg`
What are the cylindrical coordinates of the point whose rectangular coordinates are $(x = -4,\ y = 1,\ z = -2)$?

$r =$ __________
$\theta =$ __________
$z =$ __________

---

71. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_6.pg`

What are the cylindrical coordinates of the point whose spherical coordinates are $(2,\ 5,\ \frac{4\pi}{6})$?

$r =$ ____________________
$\theta =$ ____________________
$z=$ ____________________

---

72. **(1 point)** `Library/Rochester/setVMultIntegrals5Triple/ur_vc_10_9.pg`
Use cylindrical coordinates to evaluate the triple integral $\displaystyle\iiint_{\mathbf{E}} \sqrt{x^2+y^2}\, dV$, where **E** is the solid bounded by the circular paraboloid $z = 9 - 16\left(x^2+y^2\right)$ and the xy -plane.

____

---

73. **(1 point)** `Library/Rochester/setVMultIntegrals5Triple/ur_vc_10_11.pg`

Match the integrals with the type of coordinates which make them the easiest to do. Put the letter of the coordinate system to the left of the number of the integral.

___1. $\displaystyle\int_0^1 \int_0^{y^2} \frac{1}{x}\, dx\, dy$

___2. $\iiint_E z^2\,dV$ where E is: $-2 \le z \le 2,\;\; 1 \le x^2+y^2 \le 2$

___3. $\iiint_E z\,dV$ where E is: $1 \le x \le 2,\;\; 3 \le y \le 4,\;\; 5 \le z \le 6$

___4. $\iiint_E dV$ where E is: $x^2+y^2+z^2 \le 4,\;\; x \ge 0,\;\; y \ge 0,\;\; z \ge 0$

___5. $\iint_D \frac{1}{x^2+y^2}\,dA$ where D is: $x^2+y^2 \le 4$

A. cartesian coordinates
B. polar coordinates
C. spherical coordinates
D. cylindrical coordinates

---

77. (1 point) `Library/Dartmouth/setMTWCh5S6/problem_4.pg`

Electric charge is distributed over the disk $x^2+y^2 \le 10$ so that the charge density at (x,y) is $\sigma(x,y) = 15+x^2+y^2$ coulombs per square meter. Find the total charge on the disk.

____

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78. (1 point) `Library/Dartmouth/setMTWCh5S5/problem_9.pg`
FInd the volume of the ellipsoid $x^2+y^2+8z^2 = 49$.

____

---

87. (1 point) `Library/272/setStewart15_2/problem_12.pg`

Evaluate the integral $\int_0^{\pi/6}\int_5^8 (y\cos x - 2)\,dydx$.

____

---

89. (1 point) `Library/272/setStewart15_8/problem_8.pg`
Use spherical coordinates to evaluate the triple integral

$$\iiint_E \frac{e^{-(x^2+y^2+z^2)}}{\sqrt{x^2+y^2+z^2}}\,dV,$$

where E is the region bounded by the spheres $x^2+y^2+z^2 = 1$ and $x^2+y^2+z^2 = 9$.

Answer = __________________

---

91. (1 point) `Library/272/setStewart15_5/problem_3a.pg`
Find the mass of the triangular region with vertices (0, 0), (5, 0), and (0, 2), with density function $\rho(x,y) = x^2+y^2$.

____

---

92. (1 point) `Library/272/setStewart15_5/problem_5.pg`

A lamina occupies the region inside the circle $x^2+y^2 = 12y$ but outside the circle $x^2+y^2 = 36$. The density at each point is inversely proportional to its distance from the orgin.
Where is the center of mass?
(_________, __________________)

---

105. (1 point) `Library/272/setStewart15_3/problem_3.pg`
Find the volume of the solid bounded by the planes x = 0, y = 0, z = 0, and x + y + z = 8.

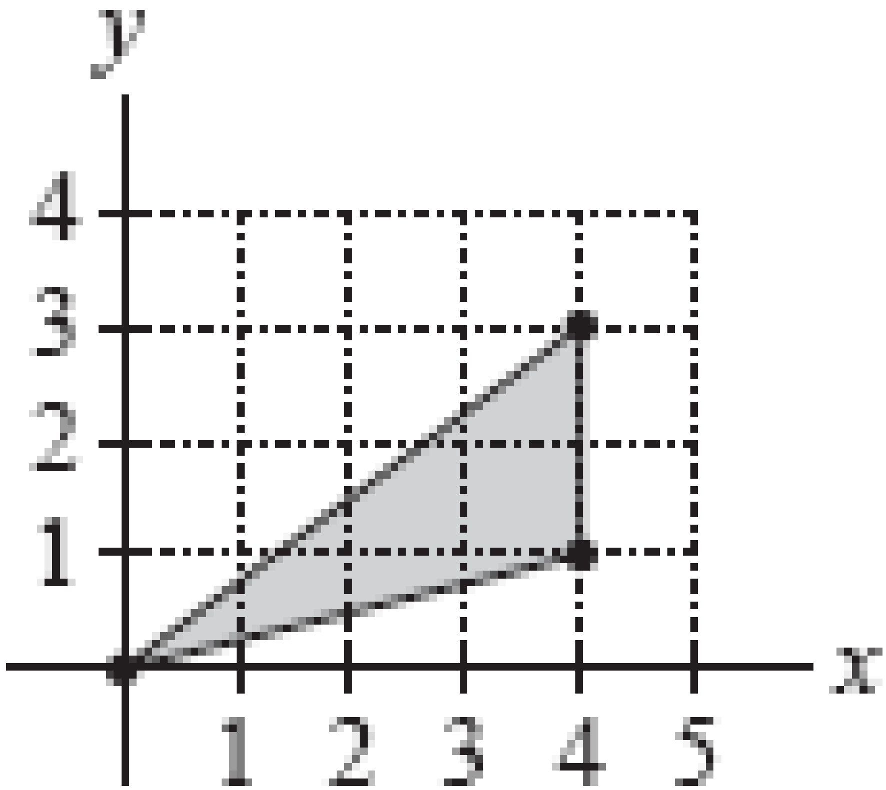
____

Integrate the function $(x^2+y^2)^{\frac{1}{4}}$ over the region E that is bounded by the xy plane below and above by the paraboloid $z = 6-6x^2-6y^2$ using cylindrical coordinates.

$$\iiint_E (x^2+y^2)^{\frac{1}{4}}\,dV = \_\_\_\int^{\_\_\_} \_\_\_\int^{\_\_\_} \_\_\_\int^{\_\_\_} \_\_\_\_\_ \quad dz\,dr\,d\theta = \_\_\_\_\_\_\_$$

124. **(1 point)** Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.2_Double_Integrals_over_More_General_Regions/15.2.39.pg

Calculate the double integral of $f(x,y)$ over the triangle indicated in the following figure:



$f(x,y) = 36ye^x$

Answer : __________

126. **(1 point)** Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.2_Double_Integrals_over_More_General_Regions/15.2.48.pg

Calculate the average height above the x-axis of a point in the region $0 \le x \le a$, $0 \le y \le x^2$ for $a = 16$.

$\overline{H} =$ __________

127. **(1 point)** Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.2_Double_Integrals_over_More_General_Regions/15.2.15.pg

Calculate the integral of $f(x,y) = 10x$ over the region $\mathcal{D}$ bounded above by $y = x(2-x)$ and below by $x = y(2-y)$.
Hint: Apply the quadratic formula to the lower boundary curve to solve for y as a function of x.

Answer : __________

---

128. **(1 point)** `Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.2_Double_Integrals_over_More_General_Regions/15.2.46.pg`

Find the volume of the region enclosed by $z = 1 - y^2$ and $z = y^2 - 1$ for $0 \le x \le 9$.

$V =$ __________

---

129. **(1 point)** `Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.4_Integration_in_Polar_Cylindrical_and_Spherical_Coordinates/15.4.49.pg`

Evaluate the triple integral of $f(x,y,z) = z(x^2+y^2+z^2)^{-3/2}$ over the part of the ball $x^2+y^2+z^2 \le 1$ defined by $z \ge 0.5$.

$\int\int\int_{\mathcal{W}} f(x,y,z)\, dV =$ __________

---

130. **(1 point)** `Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.4_Integration_in_Polar_Cylindrical_and_Spherical_Coordinates/15.4.21.pg`

Find the volume of the wedge-shaped region (Figure 1) contained in the cylinder $x^2+y^2 = 16$ and bounded above by the plane $z = x$ and below by the xy-plane.

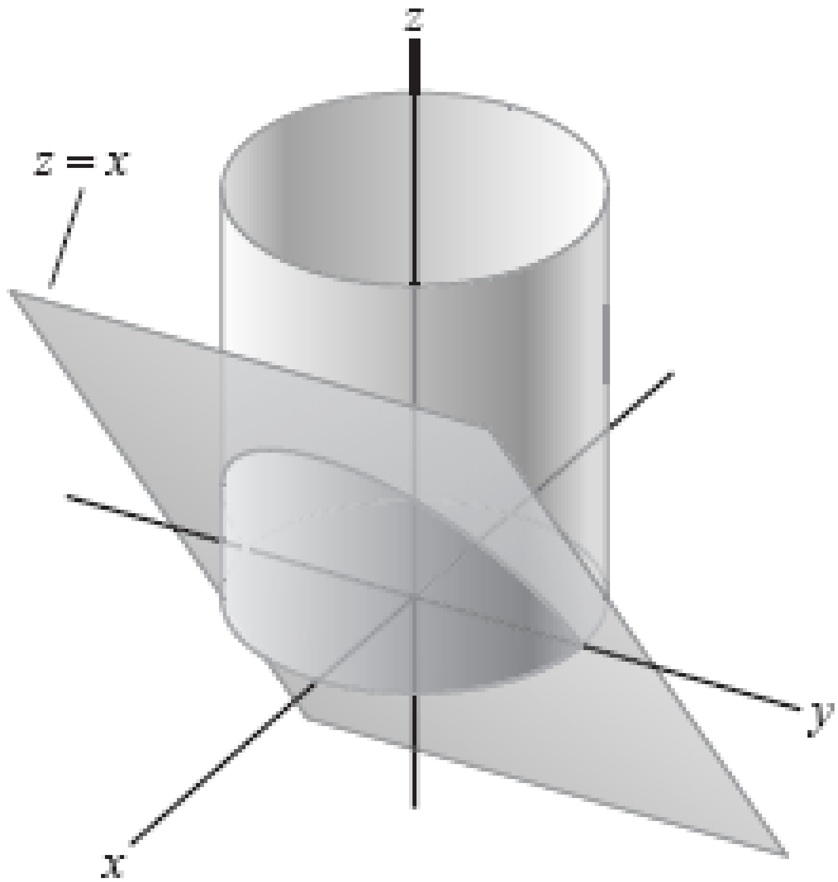


FIGURE 1

$V =$ ________

131. **(1 point)** `Library/WHFreeman/Rogawski_Calculus_Early_Transcendentals_Second_Edition/15_Multiple_Integration/15.3_Triple_Integrals/15.3.9.pg`

Evaluate $\iiint_{\mathcal{W}} f(x,y,z)\,dV$ for the function f and region $\mathcal{W}$ specified:

$$f(x,y,z) = 48(x+y) \quad \mathcal{W} : y \le z \le x, 0 \le y \le x, 0 \le x \le 1$$

$\iiint_{\mathcal{W}} (48(x+y))\,dV =$ ________

133. **(1 point)** `Library/FortLewis/Calc3/16-4-Polar-integrals/HGM5-16-4-24-Double-integrals-polar.pg`

Consider the solid shaped like an ice cream cone that is bounded by the functions $z = \sqrt{x^2+y^2}$ and $z = \sqrt{18-x^2-y^2}$. Set up an integral in polar coordinates to find the volume of this ice cream cone.

Instructions: Please enter the integrand in the first answer box, typing *theta* for θ. Depending on the order of integration you choose, enter *dr* and *dtheta* in either order into the second and third answer boxes with only one *dr* or *dtheta* in each box. Then, enter the limits of integration and evaluate the integral to find the volume.

$\int_A^B \int_C^D$ ________________ ___ ___

A = __________
B = __________
C = __________
D = __________

Volume = ____________________

---

134. **(1 point)** `Library/FortLewis/Calc3/16-4-Polar-integrals/HGM4-16-4-18-Double-integrals-polar.pg`

Convert the integral below to polar coordinates and evaluate the integral.

$$\int_0^{4/\sqrt{2}} \int_y^{\sqrt{16-y^2}} xy\,dx\,dy$$

Instructions: Please enter the integrand in the first answer box, typing *theta* for θ. Depending on the order of integration you choose, enter *dr* and *dtheta* in either order into the second and third answer boxes with only one *dr* or *dtheta* in each box. Then, enter the limits of integration and evaluate the integral to find the volume.

$$\int_A^B \int_C^D \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \; \_\_\_ \; \_\_\_$$

A = __________
B = __________
C = __________
D = __________

Volume = ____________________

---

135. **(1 point)** `Library/FortLewis/Calc3/16-4-Polar-integrals/HGM5-16-4-27-Double-integrals-polar.pg`

Consider the solid under the graph of $z = e^{-x^2-y^2}$ above the disk $x^2 + y^2 \leq a^2$, where $a > 0$.

(a) Set up the integral to find the volume of the solid.

Instructions: Please enter the integrand in the first answer box, typing *theta* for θ. Depending on the order of integration you choose, enter *dr* and *dtheta* in either order into the second and third answer boxes with only one *dr* or *dtheta* in each box. Then, enter the limits of integration.

$$\int_A^B \int_C^D \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \; \_\_\_ \; \_\_\_$$

A = __________
B = __________
C = __________
D = __________

(b) Evaluate the integral and find the volume. Your answer will be in terms of a.
Volume V = ____________________

(c) What does the volume approach as $a \to \infty$?
$\lim_{a\to\infty} V =$ ____________________

---

136. **(1 point)** `Library/FortLewis/Calc3/16-4-Polar-integrals/HGM5-16-4-14-Double-integrals-polar.pg`

Sketch the region of integration for the following integral.

$$\int_0^{\pi/4}\int_0^{4/\cos(\theta)} f(r,\theta)\, r\, dr\, d\theta$$
The region of integration is bounded by

- A. $y=0, x=\sqrt{16-y^2},$ and $y=4$
- B. $y=0, y=x,$ and $x=4$
- C. $y=0, y=\sqrt{16-x^2},$ and $x=4$
- D. $y=0, y=x,$ and $y=4$
- E. None of the above

---

137. (1 point) `Library/FortLewis/Calc3/16-2-Iterated-integrals/HGM4-16-2-38-Iterated-integrals.pg`

Consider the following integral. Sketch its region of integration in the xy-plane.

$$\int_0^3\int_{e^y}^{e^3} \frac{x}{\ln(x)}\, dx\, dy$$

(a) Which graph shows the region of integration in the xy-plane? [?/A/B/C/D]

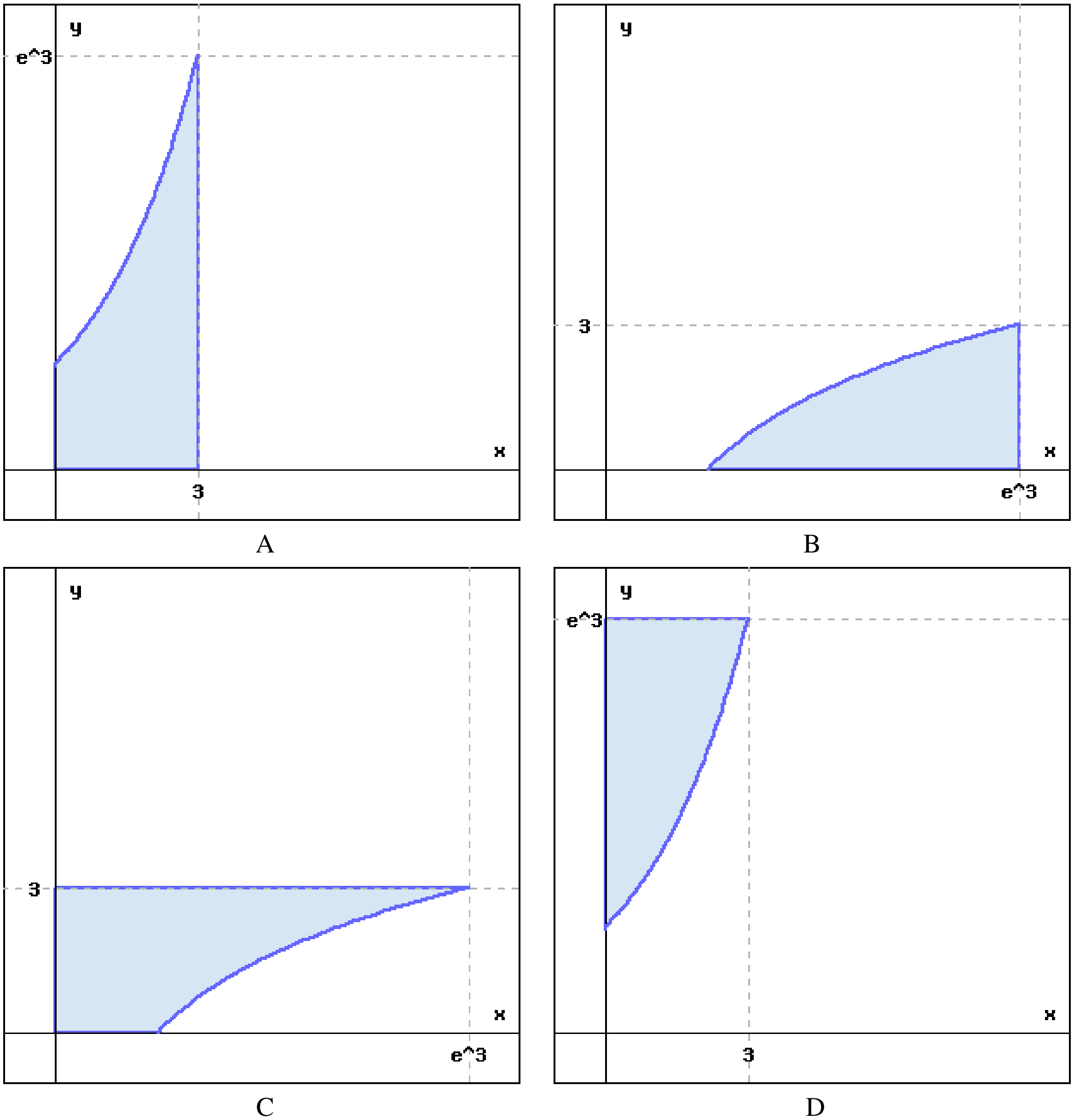
(b) Write the integral with the order of integration reversed:

$$\int_0^3\int_{e^y}^{e^3} \frac{x}{\ln(x)}\, dx\, dy = \int_A^B\int_C^D \frac{x}{\ln(x)}\, dy\, dx$$

with limits of integration

A = ___________
B = ___________
C = ___________
D = ___________

(c) Evaluate the integral. ______________________



(Click on a graph to enlarge it)

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138. **(1 point)** `Library/FortLewis/Calc3/16-2-Iterated-integrals/HGM4-16-2-43-Iterated-integrals.pg`
Set up a double integral in rectangular coordinates for calculating the volume of the solid under the graph of the function $f(x,y) = 43 - x^2 - y^2$ and above the plane $z = 7$.

Instructions: Please enter the integrand in the first answer box. Depending on the order of integration you choose, enter *dx* and *dy* in either order into the second and third answer boxes with only one *dx* or *dy* in each box. Then, enter the limits of integration.

$$\int_A^B \int_C^D \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ \_\_\_$$

A = __________
B = __________
C = __________
D = __________

---

140. **(1 point)** Library/FortLewis/Calc3/16-5-Cylindrical-integrals/HGM4-16-5-26-Cylindrical-integrals.pg

Let W be the top half of the unit sphere centered at the origin. Without calculating, determine whether each integral below is positive, negative, or zero.

[?] 1. $\iiint\limits_W -xz\,dV$

[?] 2. $\iiint\limits_W (z^2-z)\,dV$

---

141. **(1 point)** Library/FortLewis/Calc3/16-5-Cylindrical-integrals/HGM5-16-5-33-Cylindrical-integrals.pg

Evaluate the integral.

$$\int_0^6 \int_{-6}^6 \int_{-\sqrt{36-x^2}}^{\sqrt{36-x^2}} \frac{1}{(x^2+y^2)^{1/2}}\,dy\,dx\,dz = \_\_\_\_\_\_\_\_\_\_$$

---

142. **(1 point)** Library/FortLewis/Calc3/16-5-Cylindrical-integrals/HGM5-16-5-08-Cylindrical-integrals.pg

Suppose $f(x,y,z) = x^2+y^2+z^2$ and W is the solid cylinder with height 7 and base radius 3 that is centered about the z-axis with its base at $z=-1$. Enter θ as *theta*.

(a) As an iterated integral,

$$\iiint\limits_W f\,dV = \int_A^B \int_C^D \int_E^F \_\_\_\_\_\_\_\_\_\_\ dz\,dr\,d\theta$$

with limits of integration
A = __________
B = __________
C = __________
D = __________
E = __________
F = __________

(b) Evaluate the integral. ____________________

---

143. **(1 point)** Library/FortLewis/Calc3/16-1-Double-integrals/HGM4-16-1-32-Double-integrals.pg

A pile of earth standing on flat ground has height 16 meters. The ground is the xy-plane. The origin is directly below the top of the pile and the z-axis is upward. The cross-section at height z is given by $x^2+y^2 = 16-z$ for $0 \le z \le 16$, with x, y, and z in meters.

(a) What equation gives the edge of the base of the pile?

- A. $x^2+y^2=4$

- B. $x+y=16$
- C. $x^2+y^2=16$
- D. $x+y=4$
- E. None of the above

(b) What is the area of the base of the pile?

____

(c) What equation gives the cross-section of the pile with the plane $z=5$?

- A. $x^2+y^2=25$
- B. $x^2+y^2=5$
- C. $x^2+y^2=\sqrt{11}$
- D. $x^2+y^2=11$
- E. None of the above

(d) What is the area of the cross-section $z=5$ of the pile?

____

(e) What is $A(z)$, the area of a horizontal cross-section at height z?
$A(z)=$ ____________________ square meters

(f) Use your answer in part (e) to find the volume of the pile.
Volume = ____________________ cubic meters

---

152. **(1 point)** `Library/FortLewis/Calc3/16-3-Triple-integrals/HGM4-16-3-21-Triple-integrals.pg`
Suppose R is the solid bounded by the plane $z=5x$, the surface $z=x^2$, and the planes $y=0$ and $y=2$. Write an iterated integral in the form below to find the volume of the solid R.

$$\iiint\limits_R f(x,y,z)\,dV = \int_A^B \int_C^D \int_E^F \text{\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_}\; dz\,dy\,dx$$

with limits of integration

A = __________
B = __________
C = __________
D = __________
E = __________
F = __________

---

154. **(1 point)** `Library/CSUN/Calculus/Cartesian_to_polar_integral_1.pg`
Convert the integral

$$I=\int_0^{4/\sqrt{2}}\int_y^{\sqrt{16-y^2}} e^{9x^2+9y^2}\,dx\,dy$$

to polar coordinates, getting

$$\int_C^D\int_A^B h(r,\theta)\,dr\,d\theta,$$

where
$h(r,\theta)=$ _______________

$A =$ _____
$B =$ _____
$C =$ _____
$D =$ _____

and then evaluate the resulting integral to get
$I =$ _______________.

---

156. **(1 point)** Library/ASU-topics/setCalculus/stef/stef15_3p5.pg
In evaluating a double integral over a region D, a sum of iterated integrals was obtained as follows:

$$\iint_D f(x,y)\,dA = \int_0^5 \int_0^{(6/5)y} f(x,y)\,dxdy + \int_5^{11} \int_0^{11-y} f(x,y)\,dxdy\,.$$

Sketch the region D and express the double integral as an iterated integral with reversed order of integration.

$\int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)\,dydx$

$a =$ __________ $b =$ __________

$g_1(x) =$ __________ $g_2(x) =$ __________

---

157. **(1 point)** Library/ASU-topics/setCalculus/stef/stef15_3p3.pg

Consider the integral $\int_0^6 \int_0^{\sqrt{36-y}} f(x,y)dxdy$. If we change the order of integration we obtain the sum of two integrals:
$\int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)dydx + \int_c^d \int_{g_3(x)}^{g_4(x)} f(x,y)dydx$

$a =$ __________ $b =$ __________

$g_1(x) =$ __________ $g_2(x) =$ __________

$c =$ __________ $d =$ __________

$g_3(x) =$ __________ $g_4(x) =$ __________

---

158. **(1 point)** Library/ASU-topics/setCalculus/stef/stef15_7p5.pg

Evaluate the triple integral
$\iiint_E z\,dV$ where E is the solid bounded by the cylinder $y^2 + z^2 = 100$ and the planes $x = 0, y = 5x$ and $z = 0$ in the first octant.

____

---

159. **(1 point)** Library/ASU-topics/setCalculus/stef/stef15_7p3.pg

Evaluate the triple integral
$\iiint_E (x+2y)\,dV$ where E is bounded by the parabolic cylinder $y = 9x^2$ and the planes $z = 7x, y = 54x$, and $z = 0$.

____

160. **(1 point)** `Library/ASU-topics/setCalculus/stef/stef15_3p2.pg`

Consider the integral $\int_0^1 \int_x^1 f(x,y)dydx$. Sketch the region of integration and change the order of integration.

$\int_a^b \int_{g_1(y)}^{g_2(y)} f(x,y)dxdy$

$a =$ ________ $b =$ ________

$g_1(y) =$ ________ $g_2(y) =$ ________

161. **(1 point)** `Library/ASU-topics/setCalculus/stef/stef15_8p1.pg`

Find the volume of the solid that lies within the sphere $x^2+y^2+z^2=4$, above the xy plane, and outside the cone $z=3\sqrt{x^2+y^2}$.

____

186. **(1 point)** `Library/Michigan/Chap16Sec4/Q33.pg`

(a) Graph $r=1/(4\cos\theta)$ for $-\pi/2 \le \theta \le \pi/2$ and $r=1$. Then write an iterated integral in polar coordinates representing the area inside the curve $r=1$ and to the right of $r=1/(4\cos\theta)$. (Use t for θ in your work.)

With $a =$____, $b =$____,

$c =$____, and $d =$____,

area = $\int_a^b \int_c^d$ ____d___ d___

(b) Evaluate your integral to find the area.

area = ______________

190. **(1 point)** `Library/Michigan/Chap16Sec2/Q23.pg`

For the integral

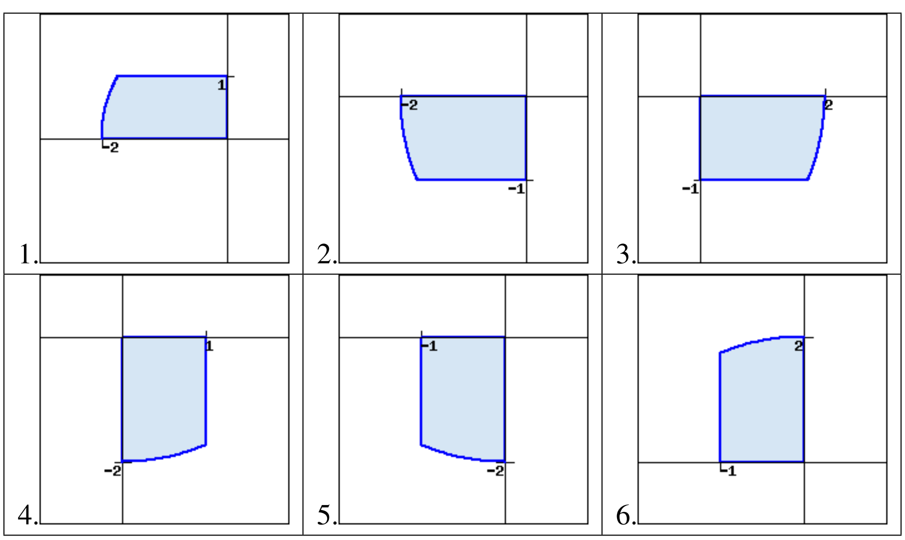
$$\int_{-1}^{0} \int_{-\sqrt{4-x^2}}^{0} 1xy\,dy\,dx,$$

sketch the region of integration and evaluate the integral.

Your sketch should be approximately the same as one of the graphs shown below; which is the correct region? Graph [?/1/2/3/4/5/6]

Then $\int_{-1}^{0} \int_{-\sqrt{4-x^2}}^{0} 1xy\,dy\,dx =$ ______________

Graphs:



192. **(1 point)** `Library/Michigan/Chap16Sec2/Q55.pg`
The function $f(x,y) = ax + by$ has an average value of 45 on the rectangle $0 \le x \le 5$, $0 \le y \le 6$.
(a) What can you say about the constants a and b?

____

(Give your answer as an equation that describes the values of a and b.)
(b) Find two different choices for f that have average value 45 on the rectangle. Both answers must be correct to receive credit.
$f =$ ________, or
$f =$ ________.

---

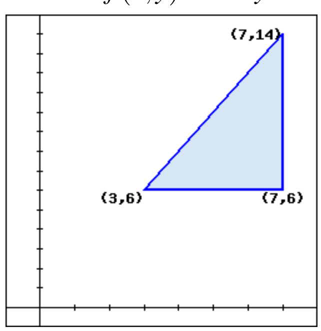
193. **(1 point)** `Library/Michigan/Chap16Sec2/Q33.pg`
Let $f(x,y) = x^2 e^{x^2}$ and let R be the triangle bounded by the lines $x = 5$, $x = y/2$, and $y = x$ in the xy-plane.
(a) Express $\int_R f\,dA$ as a double integral in two different ways by filling in the values for the integrals below. (For one of these it will be necessary to write the double integral as a sum of two integrals, as indicated; for the other, it can be written as a single integral.)
$\int_R f\,dA = \int_a^b \int_c^d f(x,y)\,d\_\_\_\ d\_\_\_$
where $a =$ ______, $b =$ ______, $c =$ ______, and $d =$ ______.
And $\int_R f\,dA = \int_a^b \int_c^d f(x,y)\,d\_\_\_\ d\_\_\_ + \int_m^n \int_p^q f(x,y)\,d\_\_\_\ d\_\_\_$
where $a =$ ______, $b =$ ______, $c =$ ______, $d =$ ______, $m =$ ______, $n =$ ______, $p =$ ______, and $q =$ ______.
(b) Evaluate one of your integrals to find the value of $\int_R f\,dA$.
$\int_R f\,dA =$ ______________

---

194. **(1 point)** `Library/Michigan/Chap16Sec2/Q47.pg`
Find the volume of the region under the graph of $f(x,y) = 2x + y + 1$ and above the region $y^2 \le x$, $0 \le x \le 16$.
volume = ______________

---

195. **(1 point)** `Library/Michigan/Chap16Sec2/Q29.pg`
Find the volume under the graph of the function $f(x,y) = 4x^2 y$ over the region shown in the figure below.



volume = ______________

---

196. **(1 point)** `Library/Michigan/Chap16Sec3/Q35.pg`
Find the mass of the solid bounded by the xy-plane, yz-plane, xz-plane, and the plane $(x/4) + (y/3) + (z/12) = 1$, if the density of the solid is given by $\delta(x,y,z) = x + 3y$.
mass = ______________

---

197. **(1 point)** `Library/Michigan/Chap16Sec3/Q47.pg`
Let W_1 be the solid half-cone bounded by $z = \sqrt{x^2 + y^2}$, $z = 1$ and the yz-plane with $x \ge 0$, and let Let W_2 be the solid half-cone bounded by $z = \sqrt{x^2 + y^2}$, $z = 3$ and the xz-plane with $y \ge 0$.
For each of the following, decide (without calculating its value) whether the integral is positive, negative, or zero.
(a) $\int_{W_2} x^2 y\,dV$ is [?/positive/negative/zero]

(b) $\int_{W_1} \sqrt[3]{x^2+y^2}\, dV$ is [?/positive/negative/zero]
(c) $\int_{W_2} x\, dV$ is [?/positive/negative/zero]

---

198. **(1 point)** `Library/Michigan/Chap17Sec5/Q11.pg`
For a sphere parameterized using the spherical coordinates θ and ϕ, describe in words the part of the sphere given by the restrictions

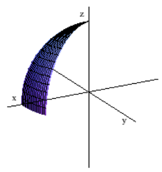
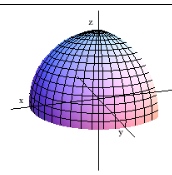
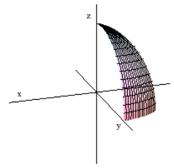
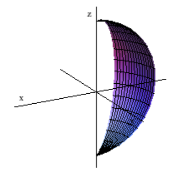
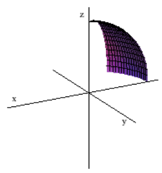
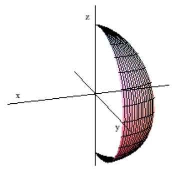
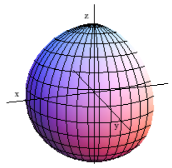
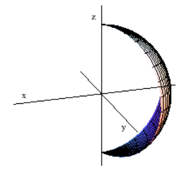
$$0 \le \theta \le 2\pi/3 \quad 0 \le \phi \le \pi$$

and

$$\pi/2 \le \theta \le 2\pi/3 \quad 0 \le \phi \le \pi.$$

Then pick the figures below that match the surfaces you described.
$0 \le \theta \le 2\pi/3 \quad 0 \le \phi \le \pi$: [?/1/2/3/4/5/6/7/8]
$\pi/2 \le \theta \le 2\pi/3 \quad 0 \le \phi \le \pi$: [?/1/2/3/4/5/6/7/8]

(Click on any graph to see a larger version.)

1.		**2.**		**3.**		**4.**	
5.		**6.**		**7.**		**8.**	

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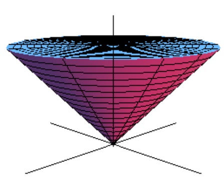
199. **(1 point)** `Library/Michigan/Chap16Sec5/Q32.pg`
The region W is the cone shown below.



The angle at the vertex is $\pi/2$, and the top is flat and at a height of 6.

Write the limits of integration for $\int_W dV$ in the following coordinates (do **not** reduce the domain of integration by taking advantage of symmetry):

(a) Cartesian:
With $a =$_______, $b =$_______,
$c =$_______, $d =$_______,
$e =$_______, and $f =$_______,
Volume = $\int_a^b \int_c^d \int_e^f$ _______ d___ d___ d___

(b) Cylindrical:
With $a =$_______, $b =$_______,
$c =$_______, $d =$_______,
$e =$_______, and $f =$_______,
Volume = $\int_a^b \int_c^d \int_e^f$ _______ d___ d___ d___

(c) Spherical:
With $a =$_______, $b =$_______,
$c =$_______, $d =$_______,
$e =$_______, and $f =$_______,
Volume = $\int_a^b \int_c^d \int_e^f$ _______ d___ d___ d___

---

200. **(1 point)** `Library/Michigan/Chap16Sec5/Q11.pg`
Evaluate, in spherical coordinates, the triple integral of $f(\rho,\theta,\phi) = \cos\phi$, over the region $0 \le \theta \le 2\pi$, $\pi/6 \le \phi \le \pi/2$, $2 \le \rho \le 3$.
integral = ________________

---

201. **(1 point)** `Library/Michigan/Chap16Sec5/Q25.pg`
Write a triple integral including limits of integration that gives the volume of the cap of the solid sphere $x^2+y^2+z^2 \le 10$ cut off by the plane $z = 3$ and restricted to the first octant. (In your integral, use theta, rho, and phi for θ, ρ and ϕ, as needed.)
What coordinates are you using? _____
(Enter **cartesian***,* **cylindrical***, or* **spherical***.)*
With $a =$_______, $b =$_______,
$c =$_______, $d =$_______,
$e =$_______, and $f =$_______,
Volume = $\int_a^b \int_c^d \int_e^f$ _______ d___ d___ d___

---

202. **(1 point)** `Library/Michigan/Chap16Sec5/Q03.pg`
Find an equation for the paraboloid $z = x^2 + y^2$ in spherical coordinates. (Enter rho, phi and theta for ρ, ϕ and θ, respectively.)
equation: ________________________

---

203. **(1 point)** `Library/Michigan/Chap16Sec5/Q45.pg`
The density, δ, of the cylinder $x^2+y^2 \le 25$, $0 \le z \le 3$ varies with the distance, r, from the z-axis:

$$\delta = 3 + r \text{ g/cm}^3.$$

Find the mass of the cylinder, assuming x, y, z are in cm.
mass = ________________
(Include **units***.)*

---

204. **(1 point)** `Library/maCalcDB/setVectors4PlanesLines/ur_vc_2_21.pg`
Match the surfaces with the appropriate descriptions.

___1. $z = 2x^2 + 3y^2$
___2. $z = 4$
___3. $z = y^2 - 2x^2$
___4. $x^2 + y^2 = 5$
___5. $z = 2x + 3y$
___6. $z = x^2$
___7. $x^2 + 2y^2 + 3z^2 = 1$

A. nonhorizontal plane
B. parabolic cylinder
C. elliptic paraboloid

D. hyperbolic paraboloid
E. circular cylinder
F. horizontal plane
G. ellipsoid