Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Chapter 14 Practice Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Evaluate the following integral.

$$\int_{4x}^{x^6} \frac{-8y}{x}\,dy$$

a. $-4\left(x^{11} - 4x\right)$

b. $4\left(x^{11} - 4x\right)$

c. $-4\left(16x - x^{11}\right)$

d. $-4\left(x^{11} - 16x\right)$

e. $8\left(x^{11} - 16x\right)$

____ 2. Evaluate the following integral.

$$\int_{11}^{5y} \frac{-4y}{x}\,dx$$

a. $-4\ln\left(\frac{5y}{11}\right)$

b. $-4\Big(\ln\big(5y\big) - \ln(11)\Big)$

c. $-4y\Big(\ln\big(5y\big) + \ln(11)\Big)$

d. $y\ln\left(\frac{5y}{11}\right)$

e. $-4y\ln\left(\frac{5y}{11}\right)$

____ 3. Evaluate the following iterated integral.

$$\int_{5}^{8}\int_{1}^{\sqrt{x}} 2ye^{-x}\,dy\,dx$$

a. $5e^{5} - 8e^{8}$

b. $5e^{-5} - 8e^{-8}$

c. $5e^{-\sqrt{5}} - 8e^{-\sqrt{8}}$

d. $5e^{-5} + 8e^{-8}$

e. $8e^{-8} - 5e^{-5}$

____ 4. Evaluate the following improper integral.

$$\int_{10}^{\infty} \int_{0}^{\frac{11}{x}} y \, dy \, dx$$

a. $\frac{20}{11}$

b. $\frac{11}{20}$

c. $\frac{20}{121}$

d. $\frac{121}{20}$

e. The integral does not converge.

____ 5. Evaluate the improper iterated integral $\int_{0}^{\infty} \int_{0}^{\infty} xye^{-\left(x^2+y^2\right)} \, dx \, dy$.

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

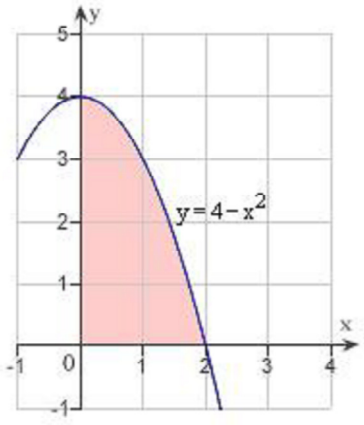
b. $\frac{5}{2}$

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

d. $\frac{1}{4}$

e. $\frac{5}{4}$

____ 6. Use an iterated integral to find the area of the region shown in the figure below.



a. $\frac{1024}{3}$

b. $\frac{16}{3}$

c. $\frac{125}{3}$

d. $\frac{17}{3}$

e. $\frac{128}{3}$

____ 7. Use an iterated integral to find the area of the region bounded by the graphs of the equations $y = 22 - x^2$ and $y = 2x + 7$.

a. $\frac{31}{3}$

b. $\frac{256}{3}$

c. $\frac{287}{6}$

d. $\frac{196}{3}$

e. $\frac{121}{3}$

____ 8. Sketch the region R of integration and then switch the order of integration for the following integral.

$$\int_0^7 \int_0^{\sqrt{49-x^2}} f(x, y)\, dy\, dx$$

a. $\int_{-7}^{7} \int_0^{\sqrt{49-y^2}} f(x, y)\, dx\, dy$

b. $\int_{-7}^{7} \int_0^{49-y^2} f(x, y)\, dx\, dy$

c. $\int_0^{7} \int_0^{\sqrt{49-y^2}} f(x, y)\, dx\, dy$

d. $\int_0^{49} \int_0^{7-y^2} f(x, y)\, dx\, dy$

e. $\int_0^{7} \int_0^{49-x^2} f(x, y)\, dx\, dy$

____ 9. Evaluate the iterated integral below. Note that it is necessary to switch the order of integration.

$$\int_0^1 \int_x^1 e^{-9y^2}\, dy\, dx$$

a. $\dfrac{1-e^{9}}{9}$

b. $\dfrac{1-e^{-9}}{18}$

c. $\dfrac{1-e^{-9}}{9}$

d. $\dfrac{e^{-9}-1}{18}$

e. $\dfrac{1-e^{-9}}{36}$

____ 10. Evaluate the iterated integral $\int_0^2 \int_{y^2}^4 \sqrt{x}\, \sin(2x)\, dx\ dy$ by switching the order of integration. Round your answer to three decimal places.

a. 0.538

b. 0.558

c. 30.538

d. 1.538

e. 4.538

____ 11. Set up an integral for both orders of integration, and use the more convenient order to evaluate the integral below over the region *R*.

$$\iint_R \frac{y}{x^2+y^2}\,dA$$

R: triangle bounded by $y = 2x, y = 6x,$ and $x = 5$

a. $5\left(\log(37) - \log(5)\right)$

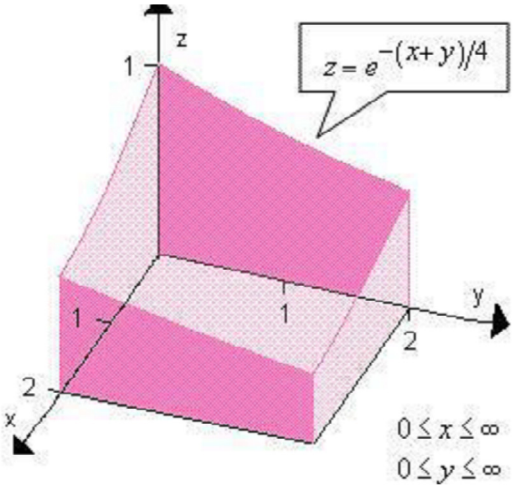
b. $\frac{2}{5}\left(\log(37) - \log(5)\right)$

c. $\frac{5}{2}\left(\log(37) - \log(5)\right)$

d. $\frac{5}{2}\left(\log(5) - \log(37)\right)$

e. $\frac{1}{3}\left(\log(37) - \log(5)\right)$

____ 12. Use a double integral to find the volume of the indicated solid.



a. 16
b. 9
c. 4
d. 20
e. 6

____ 13. Set up and evaluate a double integral to find the volume of the solid bounded by the graphs of the equations given below.

$z = xy^2, z > 0, x > 0, 5x < y < 2$

a. $\frac{7}{83}$

b. $\frac{125}{16}$

c. $\frac{83}{7}$

d. $\frac{16}{125}$

e. $\frac{32}{83}$

____ 14. Set up and evaluate a double integral to find the volume of the solid bounded by the graphs of the equations $x^2 + z^2 = 144$ and $y^2 + z^2 = 144$ in the first octant.

a. 5,184
b. 576
c. 3,456
d. 1,728
e. 1,152

____ 15. Set up and evaluate a double integral to find the volume of the solid bounded by the graphs of the equations given below.

$z = \dfrac{1}{25 + y^2}$, $x = 0, x = 2$, $y \geq 0$

a. $\dfrac{21}{4}$

b. $\dfrac{4}{21}\pi$

c. $\dfrac{1}{5}\pi$

d. $\dfrac{1}{5}$

e. $\dfrac{21}{4}\pi$

____ 16. Evaluate the iterated integral below. Note that it is necessary to switch the order of integration.

$\displaystyle\int_0^4 \int_x^4 e^{-0.45y^2}\, dy\, dx$

a. $\dfrac{e^{-7.2} - 1}{0.9}$

b. $\dfrac{1 - e^{-7.2}}{0.9}$

c. $\dfrac{1 - e^{7.2}}{0.45}$

d. $\dfrac{1 - e^{-7.2}}{0.45}$

e. $\dfrac{1 - e^{-1.8}}{1.8}$

____ 17. Find the average value of $f(x,y)$ over the region R where:

$f(x,y) = xy^5$

R: rectangle with vertices $(0,0),(5,0),(5,7),(0,7)$

a. $\frac{1}{12}$

b. $\frac{13}{84,037}$

c. $\frac{1}{13}$

d. $\frac{84,035}{12}$

e. $\frac{84,037}{13}$

____ 18. Find the average value of $f(x,y) = e^{x+y}$ over the region R, where R is a triangle with vertices $(0,0),(0,9)$ and $(9,9)$.

a. $\frac{1}{81}\left(e^9 - 1\right)^2$

b. $\frac{1}{81}\left(e^9 + 1\right)^2$

c. $\left(e^9 - 1\right)^2$

d. $\left(e^9 + 1\right)^2$

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

____ 19. Suppose the Cobb-Douglas production function for an automobile manufacturer is $f(x,y) = 100x^{0.6}y^{0.4}$, where x is the number of units of labor and y is the number of units of capital. Estimate the average production level if the number of units of labor x varies between 150 and 200 and the number of units of capital y varies between 375 and 450. Round your answer to two decimal places.

a. 229,894.96
b. 15,558.45
c. 55,174.79
d. 24,631.60
e. 5,971.30

____ 20. Suppose the temperature in degrees Celsius on the surface of a metal plate is $T(x,y) = 60 - 4x^2 - y^2$, where x and y are measured in centimeters. Estimate the average temperature if x varies between 0 and 2 centimeters and y varies between 0 and 7 centimeters.

a. $\frac{181}{3}$ degrees Celsius

b. $\frac{119}{3}$ degrees Celsius

c. $\frac{245}{3}$ degrees Celsius

d. $\frac{241}{3}$ degrees Celsius

e. $\frac{115}{3}$ degrees Celsius

____ 21. Evaluate the double integral below.

$$\int_0^{2\pi} \int_0^3 2r^5 \sin\theta \, dr \, d\theta$$

a. 3π

b. 0

c. π

d. 2π

e. $\frac{\pi}{2}$

____ 22. Evaluate the following iterated integral by converting to polar coordinates.

$$\int_0^{10} \int_0^{\sqrt{100-x^2}} y \, dy \, dx$$

a. $\frac{1000}{3}$

b. $\frac{100}{3}$

c. $\frac{100}{3}\pi$

d. $\frac{1000}{3}\pi$

e. $\frac{100}{5}\pi$

____ 23. Evaluate the iterated integral $\int_0^1 \int_{-\sqrt{x-x^2}}^{\sqrt{x-x^2}} 5\left(x^2+y^2\right) dy \, dx$ by converting to polar coordinates.

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

b. $\frac{15\pi}{64}$

c. $\frac{25\pi}{32}$

d. $\frac{25\pi}{64}$

e. $\frac{15\pi}{32}$

____ 24.

Evaluate the following iterated integral by converting to polar coordinates.

$$\int_0^5 \int_0^{\sqrt{8x-x^2}} \frac{1}{5} xy \, dy \, dx$$

a. $\frac{1275}{74}$

b. $\frac{425}{24}$

c. $\frac{49}{850}$

d. $\frac{24}{425}$

e. $\frac{74}{1275}$

____ 25. Evaluate the iterated integral $\int_{-1}^{1} \int_0^{\sqrt{1-x^2}} 8\cos\left(x^2+y^2\right) dy \, dx$ by converting to polar coordinates. Round your answer to four decimal places.

a. 10.5742
b. 13.5742
c. 17.5742
d. 28.5742
e. 14.5742

____ 26. Combine the sum of the two iterated integrals into a single integral by converting to polar coordinates. Evaluate the resulting iterated integral.

$$\int_0^2 \int_0^x \sqrt{x^2+y^2}\, dy\, dx + \int_2^{2\sqrt{2}} \int_0^{\sqrt{8-x^2}} \sqrt{x^2+y^2}\, dy\, dx$$

a. $\dfrac{3\sqrt{2}}{8\pi}$

b. $\dfrac{3\pi}{8\sqrt{2}}$

c. $\dfrac{8\pi}{3}$

d. $\dfrac{4}{3}\sqrt{2}\,\pi$

e. $\dfrac{4}{3}\pi$

____ 27. Given $f(x,y) = e^{-\left(x^2+y^2\right)/2}$, $R: x^2+y^2 \le 729$, $x \ge 0$, use polar coordinates to set up and evaluate the double integral $\int_R \int f(x,y)\, dA$.

a. $\pi\left(1-e^{-19683/2}\right)$

b. $\left(1+e^{-729/2}\right)$

c. $\pi\left(1+e^{-19683/2}\right)$

d. $\left(1-e^{-729/2}\right)$

e. $\pi\left(1-e^{-729/2}\right)$

____ 28. Use a double integral in polar coordinates to find the volume of the solid inside the hemisphere

$z = \sqrt{64 - x^2 - y^2}$

but outside the cylinder

$x^2 + y^2 = 25.$

a. $\frac{2}{3}39^{3/2}$

b. $\frac{2}{3}39^{3/2}\pi$

c. $\frac{4}{3}39^{3/2}\pi$

d. $\frac{2}{3}39^{1/2}\pi$

e. $\frac{3}{2}39^{3/2}$

____ 29. Use a double integral to find the area of the region inside the circle $r = 17\cos\theta$ and outside the cardioid $r = 1 + 15\cos\theta$. Round your answer to two decimal places.

a. 46.68
b. 58.34
c. 20.34
d. 55.34
e. 22.34

____ 30. Suppose the population density of a city is approximated by the model $f(x,y) = 6000e^{-0.01\left(x^2+y^2\right)}$, $x^2 + y^2 \le 25$, where x and y are measured in miles. Integrate the density function over the indicated circular region to approximate the population of the city. Round your answer to the nearest integer.

a. 417,127
b. 417,029
c. 833,901
d. 833,903
e. 416,951

____ 31. Find the area of the portion of the surface $z = 8x + 4y$ that lies above the triangular region with vertices $(0,0), (2,0)$, and $(0,2)$.

a. 4
b. 36
c. 18
d. 162
e. 324

____ 32. Find the area of the portion of the surface $z = 8x + 4y$ that lies above the region $R = \left\{(x,y) : x^2 + y^2 \le 4\right\}$.

a. 72
b. 36
c. 4π
d. 36π
e. 72π

____ 33. Find the area of the portion of the surface $f(x,y) = 7 + \frac{2}{3}y^{\frac{3}{2}}$ that lies above the region $R = \left\{(x,y) : 0 \le x \le 4, 0 \le y \le 4 - x\right\}$. Round your answer to two decimal places.

a. 0.05
b. 2.18
c. 11.97
d. 1.22
e. 12.51

____ 34. Find the area of the surface given by $z = f(x,y)$ over the region *R*.

$f(x,y) = xy$
$R = \{(x,y): x^2 + y^2 \le 100\}$

a. $\frac{2}{3}\left(101\sqrt{101} - 1\right)\pi$

b. $\frac{2}{3}\left(1 - 101\sqrt{101}\right)\pi$

c. $\frac{2}{3}\left(101\sqrt{101} - 1\right)$

d. $\frac{3}{4}\left(101\sqrt{101} - 1\right)\pi$

e. $\frac{2}{3}\left(100\sqrt{101} - 1\right)\pi$

____ 35. Find the area of the surface for the portion of the sphere $x^2 + y^2 + z^2 = 225$ inside the cylinder $x^2 + y^2 = 144$.

a. 540π
b. 720π
c. 360π
d. 60π
e. 40π

____ 36. Set up a double integral that gives the area of the surface of the graph of f over the region R.

$f(x,y) = x^2 - 9xy + 9y^2$

$R = \{(x,y): -6 \le x \le 6, -8 \le y \le 8\}$

a. $\int_{-6}^{6}\int_{-8}^{8} \sqrt{1 + (2x - 9y)^2 + (18y - 9x)^2}\, dxdy$

b. $\int_{-8}^{8}\int_{-6}^{6} \sqrt{1 + (2x - 9y)^2 + (18y - 9x)^2}\, dydx$

c. $\int_{-6}^{6}\int_{-8}^{8} \sqrt{1 + (2x^2 - 9y)^2 + (18y^2 - 9x)^2}\, dydx$

d. $\int_{-6}^{6}\int_{-8}^{8} \sqrt{1 + (2x - 9y)^2 + (18y - 9x)^2}\, dydx$

e. $\int_{-6}^{6}\int_{-8}^{8} \sqrt{1 + (2x + 9y)^2 + (18y + 9x)^2}\, dydx$

____ 37. Set up a double integral that gives the area of the surface on the graph of $f(x,y) = 10\cos\left(x^2+y^2\right)$ over the region $R = \left\{(x,y): x^2+y^2 \le \frac{\pi}{4}\right\}$.

a. $S = \displaystyle\int_{-\sqrt{\pi/4}}^{\sqrt{\pi/4}} \int_{-\sqrt{(\pi/4)-x^2}}^{\sqrt{(\pi/4)-x^2}} \sqrt{1+400\left(x^2+y^2\right)\sin^2\left(x^2+y^2\right)}\, dy\, dx$

b. $S = \displaystyle\int_{-\sqrt{\pi/4}}^{\sqrt{\pi/4}} \int_{-\sqrt{(\pi/4)-x^2}}^{\sqrt{(\pi/4)-x^2}} \sqrt{1+400\left(x^2+y^2\right)\cos^2\left(x^2+y^2\right)}\, dy\, dx$

c. $S = \displaystyle\int_{-\sqrt{(\pi/4)-y^2}}^{\sqrt{(\pi/4)-y^2}} \int_{-\sqrt{(\pi/4)-x^2}}^{\sqrt{(\pi/4)-x^2}} \sqrt{3+400\left(x^2+y^2\right)\cos^2\left(x^2+y^2\right)}\, dy\, dx$

d. $S = \displaystyle\int_{-\sqrt{(\pi/4)-y^2}}^{\sqrt{(\pi/4)-y^2}} \int_{-\sqrt{(\pi/4)-x^2}}^{\sqrt{(\pi/4)-x^2}} \sqrt{3+400\left(x^2+y^2\right)\sin^2\left(x^2+y^2\right)}\, dy\, dx$

e. $S = \displaystyle\int_{-\sqrt{(\pi/4)-y^2}}^{\sqrt{(\pi/4)-y^2}} \int_{-\sqrt{(\pi/4)-x^2}}^{\sqrt{(\pi/4)-x^2}} \sqrt{1+400\left(x^2+y^2\right)\cos^2\left(x^2+y^2\right)}\, dy\, dx$

____ 38. Set up a double integral that gives the area of the surface of the graph of f over the region R.

$f(x,y) = e^{9xy}$

$R = \{(x,y): 0 \le x \le 6,\ 0 \le y \le 2\}$

a. $\int_0^2 \int_0^6 \sqrt{1+81e^{18xy}\left(x^2+y^2\right)}\,dx\,dy$

b. $\int_0^2 \int_0^6 \sqrt{1+81e^{18xy}\left(x^2+y^2\right)}\,dy\,dx$

c. $\int_0^2 \int_0^6 \sqrt{1+81e^{9xy}\left(x^2+y^2\right)}\,dx\,dy$

d. $\int_0^2 \int_0^6 \sqrt{1+9e^{9xy}\left(x^2+y^2\right)}\,dx\,dy$

e. $\int_0^6 \int_0^2 \sqrt{1+81e^{18xy}\left(x^2+y^2\right)}\,dx\,dy$

____ 39. A company produces a spherical object of radius 17 centimeters. A hole of radius 7 centimeters is drilled through the center of the object. Find the volume of the object.

a. $1{,}344\pi\sqrt{15}\ \text{cm}^3$
b. $1{,}680\pi\sqrt{15}\ \text{cm}^3$
c. $1{,}280\pi\sqrt{15}\ \text{cm}^3$
d. $3{,}360\pi\sqrt{15}\ \text{cm}^3$
e. $1{,}120\pi\sqrt{15}\ \text{cm}^3$

____ 40. A company produces a spherical object of radius 24 centimeters. A hole of radius 5 centimeters is drilled through the center of the object. Find the outer surface area of the object.

a. $73\pi\sqrt{551}$ cm^3

b. $5\pi\sqrt{551}$ cm^3

c. $24\pi\sqrt{551}$ cm^3

d. $20\pi\sqrt{551}$ cm^3

e. $96\pi\sqrt{551}$ cm^3

____ 41. Evaluate the iterated integral $\int_0^{\frac{\pi}{2}} \int_0^{\frac{y}{7}} \int_0^{\frac{2}{y}} 3\sin y \, dz \, dx \, dy$.

a. $\frac{3}{14}$

b. $\frac{6}{7}$

c. $\frac{2}{7}\pi$

d. $\frac{3}{7}\pi$

e. $\frac{4}{7}$

____ 42. Set up a triple integral for the volume of the solid bounded by the coordinate planes and the plane given below.

$z = 12 - 6x - 8y$

a. $\int_0^2 \int_0^{\frac{12-6x}{8}} \int_0^{12-6x-8y} dz\, dy\, dx$

b. $\int_0^2 \int_0^{\frac{12-6x}{8}} \int_0^{12-6x-8y} dy\, dz\, dx$

c. $\int_0^{12} \int_0^{\frac{12-6x}{8}} \int_0^{12-6x-8y} dz\, dy\, dx$

d. $\int_0^2 \int_0^{\frac{12-6x}{8}} \int_0^{12-6x-8y} dx\, dy\, dz$

e. $\int_0^{\frac{12-6x}{8}} \int_0^2 \int_0^{12-6x-8y} dz\, dy\, dx$

____ 43. Set up a triple integral for the volume of the solid bounded by $z = 7 - x^2 - y^2$ and $z = 0$.

a. $\int_{-\sqrt{7}}^{\sqrt{7}} \int_{-7}^{\sqrt{7-x^2}} \int_{0}^{7-x^2-y^2} dz\, dx\, dy$

b. $\int_{-7}^{7} \int_{-7}^{7-x^2} \int_{0}^{7-x^2-y^2} dz\, dx\, dy$

c. $\int_{-\sqrt{7}}^{\sqrt{7}} \int_{-\sqrt{7-x^2}}^{\sqrt{7-x^2}} \int_{0}^{\sqrt{7-x^2-y^2}} dz\, dx\, dy$

d. $\int_{-\sqrt{7}}^{\sqrt{7}} \int_{-\sqrt{7-x^2}}^{\sqrt{7-x^2}} \int_{0}^{7-x^2-y^2} dz\, dy\, dx$

e. $\int_{-7}^{7} \int_{-\sqrt{7+x^2}}^{7-x^2} \int_{0}^{7-x^2-y^2} dz\, dy\, dx$

____ 44. Rewrite the iterated integral $\int_0^6 \int_0^{\frac{(6-x)}{2}} \int_0^{\frac{24-4x-8y}{8}} dz\,dy\,dx$ using the order $dy\,dx\,dz$.

a. $\int_0^{24} \int_0^{\frac{(24-z)}{8}} \int_0^{\frac{(24-3z-x)}{4}} dy\,dx\,dz$

b. $\int_0^{8} \int_0^{\frac{(24-3z)}{3}} \int_0^{\frac{(24-3z-4x)}{8}} dy\,dx\,dz$

c. $\int_0^{8} \int_0^{\frac{(24-3z)}{3}} \int_0^{\frac{(24-3z-x)}{4}} dy\,dx\,dz$

d. $\int_0^{6} \int_0^{\frac{(24-z)}{3}} \int_0^{\frac{(24-3z-4x)}{8}} dy\,dx\,dz$

e. $\int_0^{24} \int_0^{\frac{(24-3z)}{4}} \int_0^{\frac{(24-3z-4x)}{8}} dy\,dx\,dz$

____ 45. Sketch the solid whose volume is given by the iterated integral given below and use the sketch to rewrite the integral using the indicated order of integration.

$$\int_0^2 \int_y^2 \int_0^{\sqrt{4-y^2}} dz\, dx\, dy$$

Rewrite the integral using the order $dz\, dy\, dx$.

a. $$\int_0^2 \int_0^2 \int_0^{\sqrt{4-z^2}} dz\, dy\, dx$$

b. $$\int_{-2}^2 \int_0^x \int_0^{\sqrt{4-y^2}} dz\, dy\, dx$$

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

d. $$\int_0^2 \int_0^x \int_0^{\sqrt{4-y^2}} dz\, dy\, dx$$

e. $$\int_0^2 \int_x^4 \int_0^{\sqrt{4-y^2}} dz\, dy\, dx$$

____ 46. Evaluate the following iterated integral.

$$\int_0^{\pi/2} \int_0^{\cos^2\theta} \int_0^{1-r^2} r\sin\theta \, dz\, dr\, d\theta$$

a. $\frac{11}{180}$

b. $\frac{13}{180}$

c. $\frac{1}{12}$

d. $\frac{180}{11}$

e. $\frac{12}{1}$

____ 47. Evaluate the following iterated integral.

$$\int_0^{\pi/15} \int_0^{\pi/15\cos\theta} \int_0^{} \rho^2 \sin\phi\cos\phi \, d\rho\, d\theta\, d\phi$$

a. $\frac{1}{36}\left(5+\cos\frac{2\pi}{15}\right)\sin^3\frac{\pi}{15}$

b. $\frac{1}{6}\left(5+\cos\frac{2\pi}{15}\right)\sin^3\frac{\pi}{15}$

c. $\frac{1}{6}\left(3+\cos\frac{2\pi}{15}\right)\sin^2\frac{\pi}{15}$

d. $\frac{1}{36}\left(5+\cos\frac{\pi}{15}\right)\sin^3\frac{\pi}{15}$

e. $\frac{1}{36}\left(5+\cos\frac{2\pi}{15}\right)\sin^2\frac{\pi}{15}$

____ 48. Convert the integral below from rectangular coordinates to both cylindrical and spherical coordinates, and evaluate the simpler iterated integral.

$$\int_{-3}^{3}\int_{-\sqrt{9-x^2}}^{\sqrt{9-x^2}}\int_{x^2+y^2}^{9} x\,dz\,dy\,dx$$

a. 8π

b. $\frac{1}{4}$

c. $\frac{1}{4}\pi$

d. 2π

e. 0

____ 49. Convert the integral below from rectangular coordinates to both cylindrical and spherical coordinates, and evaluate the simpler iterated integral.

$$\int_{0}^{9}\int_{0}^{\sqrt{81-x^2}}\int_{0}^{\sqrt{81-x^2-y^2}} \sqrt{x^2+y^2+z^2}\,dz\,dy\,dx$$

a. $\frac{729}{8}\pi$

b. $\frac{6561}{4}\pi$

c. 6561π

d. $\frac{6561}{2}\pi$

e. $\frac{6561}{8}\pi$

____ 50. Use cylindrical coordinates to find the volume of the solid bounded above by $z = 15x$ and below by $z = 15x^2 + 15y^2$.

a. $\frac{15}{32}\pi$

b. $\frac{15}{22}\pi$

c. $\frac{3}{10}\pi$

d. $\frac{15}{46}\pi$

e. $\frac{15}{64}\pi$

____ 51. Use spherical coordinates to find the volume of the solid inside $x^2 + y^2 + z^2 = 121$ and outside $z = \sqrt{x^2 + y^2}$, and above the xy-plane.

a. $242\sqrt{2}\pi$

b. $11\sqrt{3}\pi$

c. $\frac{1331}{3}\sqrt{2}\pi$

d. $11\sqrt{2}\pi$

e. $\frac{1331}{3}\sqrt{3}\pi$

____ 52. Use spherical coordinates to find the volume of the solid inside the torus given by $\rho = 11\sin\phi$.

a. $\frac{671}{2}\pi^2$

b. $\frac{671}{2}$

c. $\frac{1331}{4}\pi$

d. $\frac{1331}{8}\pi$

e. $\frac{1331}{4}\pi^2$

____ 53. Find the Jacobian $\frac{\partial(x,y)}{\partial(u,v)}$ for the following change of variables:

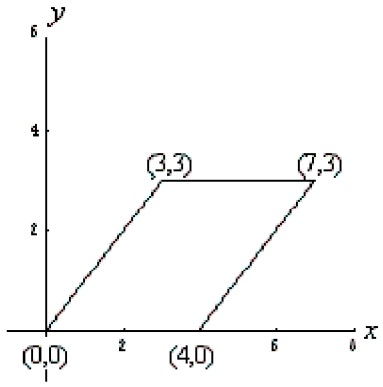
$x = 3u\cos\theta - v\sin\theta,\ y = 3u\sin\theta + v\cos\theta$

a. 3
b. –6
c. 8
d. –3
e. 6

____ 54. Use the indicated change of variables to evaluate the following double integral.

$x = u + v,\ y = u$

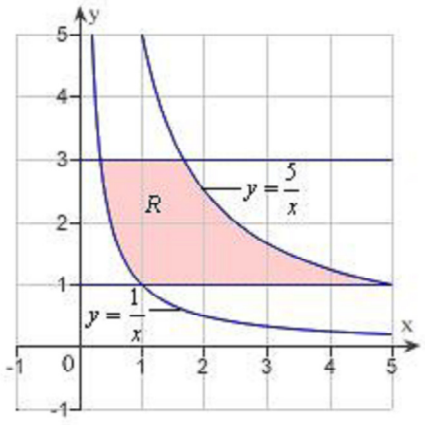
$$\iint_R y\left(x - y\right) dA$$



a. 18
b. 36
c. −36
d. 32
e. 56

____ 55. Use the following change of variables to evaluate the double integral $\iint_R y \sin xy \, dA$.

Round your answer to four decimal places.



$x = \frac{u}{v}$, $y = v$

a. 3.6008
b. 1.2688
c. 2.0133
d. 0.5133
e. 2.2633

Chapter 14 Practice Test
Answer Section

MULTIPLE CHOICE

1. D
2. E
3. B
4. D
5. D
6. B
7. B
8. C
9. B
10. A
11. C
12. A
13. D
14. E
15. C
16. B
17. D
18. A
19. D
20. E
21. B
22. A
23. E
24. B
25. A
26. D
27. E
28. B
29. C
30. E
31. C
32. D
33. C
34. A
35. C
36. D
37. A
38. A
39. C

40. E
41. B
42. A
43. D
44. B
45. D
46. B
47. A
48. E
49. E
50. A
51. C
52. E
53. A
54. B
55. D