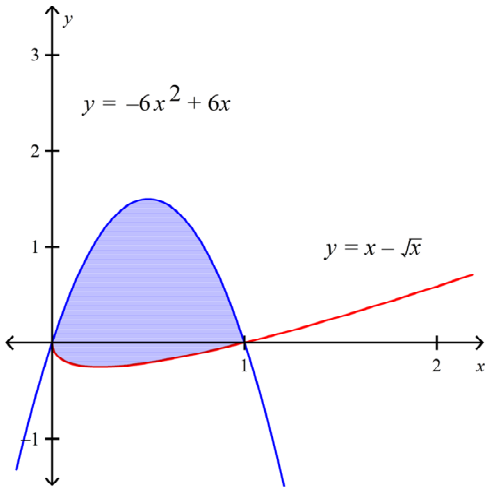
2414-PracticeTest1-Fall18

Multiple Choice (6pts each)
Identify the choice that best completes the statement or answers the question. Select one choice only. No partial credit.

____ 1. Find the area of the shaded region.



a. 7

b. $\frac{7}{12}$

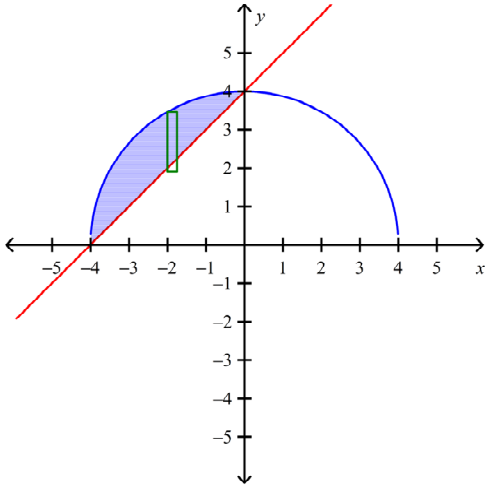
c. $\frac{1}{6}$

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

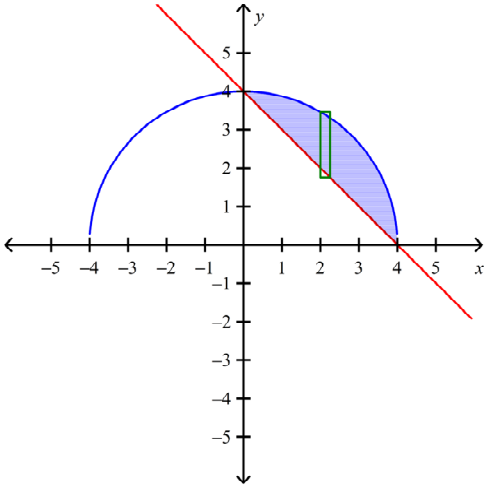
____ 2. Use the method of cylindrical shells to find the volume of the solid generated by revolving the region bounded by the graphs of the equations about the indicated axis. Sketch the region and a representative rectangle.

$y = \sqrt{16 - x^2}$, $y = -x + 4$; the y-axis

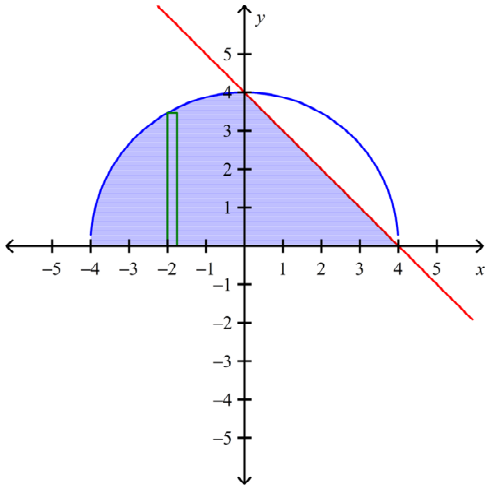
a. $\frac{64}{3}\pi$



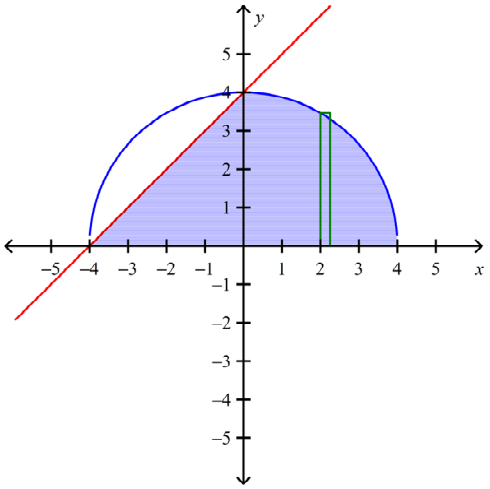
c. $\frac{64}{3}\pi$



b. 128π



d. 128π



____ 3. Find the volume of the solid obtained by rotating the region bounded by $y = 2\sqrt[4]{x}$ and $y = 2x$ about the line $y = 2$.

a. $\frac{16\pi}{15}$

b. $\frac{2}{9}$

c. $\frac{1}{16}$

d. $\frac{\pi}{9}$

e. $\frac{8\pi}{9}$

____ 4. If 4 J of work are needed to stretch a spring from 10 cm to 12 cm and another 20 J are needed to stretch it from 12 cm to 14 cm, what is the natural length of the spring? Round the answer to nearest integer.

a. 12 cm
b. 8 cm
c. 13 cm
d. 11 cm
e. 10 cm

____ 5. A bucket weighs 5 lb and a rope of negligible weight are used to draw water from a well that is 40 ft deep. The bucket starts with 50 lb of water and is pulled up at a rate of 10 ft/s, but water leaks out of a hole in the bucket at a rate of 0.5 lb/s. Find the work done in pulling the bucket to the top of the well.

a. 2,160 ft-lb
b. 2,660 ft-lb
c. 3,660 ft-lb
d. 2,260 ft-lb
e. 3,160 ft-lb

____ 6. Find the integral.

$\int x^5 \ln x \ dx$

a. $\frac{1}{6}x^6(6\ln x - 1) + C$

b. $\frac{1}{36}x^6(\ln x - 1) + C$

c. $\frac{1}{6}x^5 + \frac{1}{x} + C$

d. $\frac{1}{36}x^6(6\ln x - 1) + C$

____ 7. Find the length of the curve.

$y = 2\ln\left(\sin\frac{x}{2}\right), \ \frac{\pi}{5} \le x \le \pi$

a. $\ln\left(2 + \sqrt{5}\right)$

b. $\ln\left(\sqrt{5}\right)$

c. $\ln(5)$

d. $\ln\left(2\sqrt{5}\right)$

e. None of these

____ 8. Set up, but do not evaluate, an integral for the area of the surface obtained by rotating the curve $y = \ln x^7$ about the x-axis on the interval $1 \le x \le 7$.

a. $\int_7^1 2\pi \sqrt{1 + \left(\frac{7}{x}\right)^2}\, dx$

b. $\int_7^1 2\pi x \ln(x) \sqrt{1 + \left(\frac{7}{x}\right)^2}\, dx$

c. $\int_1^7 2\pi (7x) \sqrt{1 + \left(\frac{7}{x}\right)^2}\, dx$

d. $\int_7^1 2\pi (7x) \sqrt{1 + \left(\frac{7}{x}\right)^2}\, dx$

e. $\int_1^7 2\pi \left(7 \ln(x)\right) \sqrt{1 + \left(\frac{7}{x}\right)^2}\, dx$

____ 9. Find the area of the surface obtained by rotating the curve about the y-axis.

$y = \frac{1}{4}x^2 - \frac{1}{2}\ln x,\ 1 \le x \le 8$

a. $\frac{3\pi}{2}$

b. $\frac{10}{3}$

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

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

e. None of these

____ 10. Find the centroid of the region bounded by the graphs of the given equations.

$y = 15 - x^2, \quad y = 3 - x$

a. $\left(\frac{1}{2}, \frac{37}{5}\right)$

b. $\left(\frac{1}{2}, \frac{5}{2}\right)$

c. $\left(\frac{5}{2}, \frac{1}{2}\right)$

d. $\left(\frac{37}{5}, \frac{1}{2}\right)$

Essay (10pts each)

Show all work to justfity your answer. Answers with no work or insufficient work will receive NO credit. Partial credit may be given.

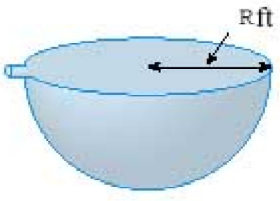
1. Use the arc length formula to find the length of the curve.

   $y = 5 - 3x, \ -8 \le x \le -4$

2. Find the values of c such that the area of the region bounded by the parabolas $y = x^2 - c^2$ and $y = c^2 - x^2$ is 72.

3. The base of a solid is a circular disk with radius 5. Find the volume of the solid if parallel cross-sections perpendicular to the base are isosceles right triangles with hypotenuse lying along the base.

4. The tank shown is full of water. Given that water weighs 62.5 lb/ft and R = 5, find the work (in lb-ft) required to pump the water out of the tank.



hemisphere

2414-PracticeTest1-Fall18
Answer Section

MULTIPLE CHOICE

1.	ANS: D	PTS: 1	DIF: Medium	REF: 5.1.2			
	KEY: 7e	MSC: Bimodal	NOT: Section 5.1				
2.	ANS: C	PTS: 1	DIF: Medium	REF: 5.3.6			
	KEY: 7e	MSC: Bimodal	NOT: Section 5.3				
3.	ANS: A	PTS: 1	DIF: Medium	REF: 5.2.5			
	KEY: 7e	MSC: Bimodal	NOT: Section 5.2				
4.	ANS: D	PTS: 1	DIF: Medium	REF: 5.4.12			
	KEY: 7e	MSC: Bimodal	NOT: Section 5.4				
5.	ANS: A	PTS: 1	DIF: Medium	REF: 5.4.16			
	KEY: 7e	MSC: Bimodal	NOT: Section 5.4				
6.	ANS: D	PTS: 1	DIF: Medium	REF: 7.1.12			
	KEY: 7e	MSC: Bimodal	NOT: Section 7.1				
7.	ANS: E	PTS: 1	DIF: Medium	REF: 8.1.12			
	KEY: 7e	MSC: Bimodal	NOT: Section 8.1				
8.	ANS: E	PTS: 1	DIF: Medium	REF: 8.2.4			
	KEY: 7e	MSC: Bimodal	NOT: Section 8.2				
9.	ANS: E	PTS: 1	DIF: Medium	REF: 8.2.16			
	KEY: 7e	MSC: Bimodal	NOT: Section 8.2				
10.	ANS: A	PTS: 1	DIF: Medium	REF: 8.3.30			
	KEY: 7e	MSC: Bimodal	NOT: Section 8.3				

ESSAY

1. ANS:
$4\sqrt{10}$

   PTS: 1 DIF: Medium REF: 8.1.1 KEY: 7e
   MSC: Numerical Response NOT: Section 8.1

2. ANS:
± 3

   PTS: 1 DIF: Medium REF: 5.1.53 KEY: 7e
   MSC: Numerical Response NOT: Section 5.1

3. ANS:
132

   PTS: 1 DIF: Medium REF: 5.2.54 KEY: 7e
   MSC: Numerical Response NOT: Section 5.2

4. ANS:
   981,748 ft-lb

   PTS: 1 DIF: Medium REF: 5.4.22 KEY: 7e
   MSC: Numerical Response NOT: Section 5.4