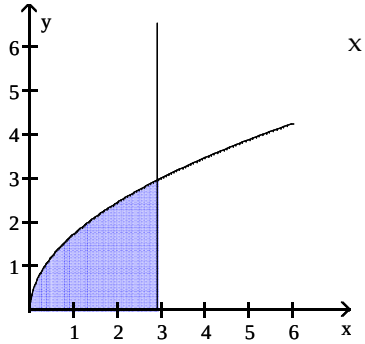
Exam 2 Math 2414 Litong Name _____Test No, _____

Find the volume of the solid generated by revolving the shaded region about the given axis.

1) About the y–axis



$x = \frac{y^2}{3}$

Find the volume of the solid generated by revolving the region bounded by the given lines and curves about the x–axis.

2) $y = \sqrt{\sin 6x}$, $y = 0$, $0 \le x \le \frac{\pi}{6}$

Find the volume of the solid generated by revolving the region about the y–axis.

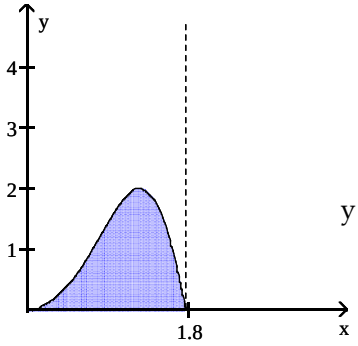
3) The region in the first quadrant bounded on the left by the circle $x^2 + y^2 = 9$, on the right by the line $x = 3$, and above by the line $y = 3$

Find the volume of the solid generated by revolving the region bounded by the given lines and curves about the x–axis.

4) $y = \sec x$, $y = \tan x$, $x = 0$, $x = \frac{\pi}{4}$

Use the shell method to find the volume of the solid generated by revolving the shaded region about the indicated axis.

5) About the y–axis



$y = 2\sin(x^2)$

Use the shell method to find the volume of the solid generated by revolving the region bounded by the given curves and lines about the x–axis.

6) $y = 9x^2$, $y = 9\sqrt{x}$

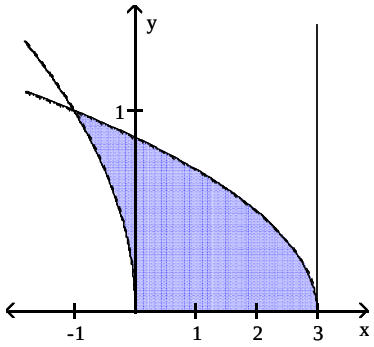
Find the volume of the solid generated by revolving the region about the given axis. Use the shell or washer method.

7) The region bounded by $x = 2\sqrt{y}$, $x = -2y$, and $y = 1$ about the line $y = 1$

Provide an appropriate response.

8) The region shown here is to be revolved about the x–axis to generate a solid. Which o the methods (disk, washer, shell) could you use to find the volume of the solid? How many integrals would be required in each case?

$x = -y^2$



$x = -4y^2 + 3$

Find the length of the curve.

9) $y = (9 - x^{2/3})^{3/2}$ from $x = 1$ to $x = 27$

10) $y = \int_1^x \sqrt{t^2 - 1}\, dt$, $4 \le x \le 7$

Set up an integral for the length of the curve.

11) $y = \sqrt{1 - x^5}$, $-\frac{1}{4} \le x \le \frac{1}{4}$

12) $y = 8 \cos x$, $0 \le x \le \pi$

Solve the problem.

13) The cable of a bridge can be described by the equation $y = 0.06x^{3/2}$ from $x = 0$ to $x = 200$ ft. Find the length of the cable, rounded to the nearest foot.

Set up an integral for the area of the surface generated by revolving the given curve about the indicated axis.

14) $y = \tan x$, $0 \le x \le \pi/4$; x–axis

15) $xy = 3$, $1 \le y \le 2$; y–axis

Solve the problem.

16) A force of 1100 lb compresses a spring from its natural length of 17 in. to a length of 12 in. How much work is done in compressing it from 12 in. to 5 in.? Round final answer to the nearest thousand.

17) Find the work done in winding up a 250–ft cable that weighs 5.00 lb/ft. Round final answer to the nearest thousand.

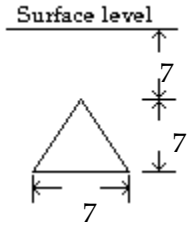
18) A vertical right circular cylindrical tank measures 20 ft high and 14 ft in diameter. It is full of oil weighing 60 lb/ft^3. How much work does it take to pump the oil to the level of the top of the tank? Give your answer to the nearest ft • lb.

Find the center of mass of a thin plate of constant density covering the given region.

19) The region bounded by the x–axis and the curve $y = 7\sin x$, $0 \le x \le \pi$

Find the fluid force exerted against the vertically submerged flat surface depicted in the diagram. Assume arbitrary units, and call the weight–density of the fluid w.

20)



Solve the problem.

21) A tank truck hauls oil in a 10–ft–diameter horizontal right circular cylindrical tank. If the density of the oil is 60 lb/ft^3, how much fluid force does the oil exert on each end of the tank when the tank is half full?

1) $\frac{108}{5}\pi$

2) $\frac{1}{3}\pi$

3) 9π

4) $\frac{\pi^2}{4}$

5) 4π

6) $\frac{243}{10}\pi$

7) $\frac{26}{15}\pi$

8) The volume can be found using the washer method with 2 integrals or using the shell method with 1 integral.

9) 36

10) $\frac{33}{2}$

11) $\int_{-1/4}^{1/4} \sqrt{\frac{4 - 4x^5 + 25x^8}{4(1 - x^5)}}\, dx$

12) $\int_{0}^{\pi} \sqrt{1 + 64 \sin^2 x}\, dx$

13) 267 ft

14) $2\pi \int_{0}^{\pi/4} \tan x \sqrt{1 + \sec^4 x}\, dx$

15) $6\pi \int_{1}^{2} \frac{1}{y} \sqrt{1 + 9y^{-4}}\, dx$

16) 13,000 lb•in.

17) 156,000 ft•lb

18) 1,847,256 ft • lb

19) $\bar{x} = \frac{\pi}{2}, \bar{y} = \frac{7\pi}{8}$

20) $\frac{1715}{6}w$

21) 5000 lb