

Name _____

Find the length of the curve.

1) $y = 3x^{3/2}$ from $x = 0$ to $x = \frac{5}{9}$

2) $x = \frac{y^4}{8} + \frac{1}{4y^2}$ from $y = 1$ to $y = 3$

3) $y = \int_0^x \sqrt{4 \sin^2 t - 1} dt$, $0 \leq x \leq \frac{\pi}{2}$

4) $y = \int_1^x \sqrt{t^2 - 1} dt$, $3 \leq x \leq 6$

Set up an integral for the length of the curve.

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

6) $x = \sin 5y, -\pi \leq y \leq 0$

Find the area of the surface generated by revolving the curve about the indicated axis.

7) $y = x^3/5, 0 \leq x \leq 2; x\text{-axis}$

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

8) $y = x^5, 0 \leq x \leq 2; x\text{-axis}$

9) $y = \sin x, 0 \leq x \leq \pi/4; x\text{-axis}$

Solve the problem.

10) A company applies a clear glaze finish on the outside of the ceramic bowls it produces. The bowl corresponds to the bottom half of a sphere which is created by rotating the circle $x^2 + y^2 = 36$ around the x -axis. The finish is to be 0.2 cm thick, and the company wants to create 3000 bowls. Use the fact that $1 \text{ L} = 1000 \text{ cm}^3$ to calculate how many liters of finish are required. Assume that all specifications for the bowl are in cm.

11) A tank truck hauls oil in a 4-ft-diameter horizontal right circular cylindrical tank. If the density of the oil is 60 lb/ft^3 , how much force does the oil exert on each end of the tank when the tank is half full?

12) A rectangular sea aquarium observation window is 16.0 ft wide and 4.00 ft high. What is the force on this window if the upper edge is 5.00 ft below the surface of the water. The density of seawater is 64.0 lb/ft^3 .

Find the center of mass of the particles with the given masses located at the given points.

13) 2.2 at (1.9, 0), 6.8 at (4.9, 0), 8.5 at (3.6, 0)

14) 7 at (-2, -3), 9 at (-1, -1), 10 at (1, 1), 12 at (3, 2), 13 at (5, 4)

Find the centroid of the region bounded by the given curves.

15) The region bounded by $y = x^2$ and $y = 3$

16) The region bounded by the x-axis and the curve $y = 3\sin x$, $0 \leq x \leq \pi$

17) The region bounded by the parabola $x = y^2$ and the line $x = 16$

Use Pappus's Theorem to solve.

18) Find the volume of the torus generated by revolving the circle $(x - 4)^2 + y^2 = 1$ about the y-axis.

Answer Key

Testname: MATH3B_HWCH8

1) $\frac{335}{243}$

Objective: (6.3) Find Length of Curve

2) $\frac{92}{9}$

Objective: (6.3) Find Length of Curve

3) 2

Objective: (6.5) Find Arc Length

4) $\frac{27}{2}$

Objective: (6.5) Find Arc Length

5) $\int_0^{\pi/4} \sqrt{1+16 \sec^4 y} dy$

Objective: (6.5) Find Integral for Arc Length

6) $\int_{-\pi}^0 \sqrt{1+25 \cos^2 5y} dy$

Objective: (6.5) Find Integral for Arc Length

7) $\frac{2072}{675}\pi$

Objective: (6.4) Find Area of Surface Generated by Revolving Curve About Axis

8) $2\pi \int_0^2 x^5 \sqrt{1+25x^8} dx$

Objective: (6.4) Set Up Integral for Area of Surface

9) $2\pi \int_0^{\pi/4} \sin x \sqrt{1+\cos^2 x} dx$

Objective: (6.4) Set Up Integral for Area of Surface

10) 135.72 L of finish

Objective: (6.4) Solve Apps: Area of Surface

11) 320 lb

Objective: (6.5) Solve Apps: Fluid Forces

12) 28,700 lb

Objective: (6.5) Solve Apps: Fluid Forces

13) $\bar{x} = 3.9, \bar{y} = 0$

Objective: (6.6) Find Center of Mass of Particles

14) $\bar{x} = \frac{88}{51}, \bar{y} = \frac{56}{51}$

Objective: (6.6) Find Center of Mass of Particles

15) $\bar{x} = 0, \bar{y} = \frac{9}{5}$

Objective: (6.6) Find Centroid of Region Bounded by Curves

Answer Key

Testname: MATH3B_HWCH8

16) $\bar{x} = \frac{\pi}{2}, \bar{y} = \frac{3\pi}{8}$

Objective: (6.6) Find Centroid of Region Bounded by Curves

17) $\bar{x} = \frac{48}{5}, \bar{y} = 0$

Objective: (6.6) Find Centroid of Region Bounded by Curves

18) $8\pi^2$

Objective: (6.6) Use Pappus's Theorem