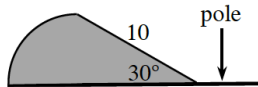


Homework #16

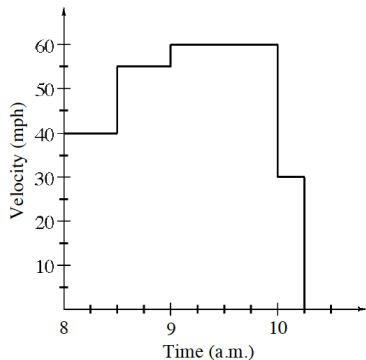
First & Last Name: _____ Class: _____

For homework to be graded, it must be *fully completed*. This means you must **show your work**.

1. The shaded region below represents a quarter circle combined with a right triangle “flag” .



- Imagine rotating this flag about its “pole” and describe the resulting three-dimensional figure. Draw a picture of this figure on your paper. To help you visualize this, use [Desmos](https://www.desmos.com/calculator/1baj96pljx) (desmos.com/calculator/1baj96pljx).
 - Calculate the volume of the rotated flag.
2. For $f(x) = 3 \cos(x)$, approximate the area under the curve for $0 \leq x \leq \frac{\pi}{2}$ using two different methods. If the actual area is approximately 1.712 square units, which of your methods was most accurate? Analyze why that particular method was more accurate.
3. [Challenge] If $\sin(x) = \frac{1}{2}$ then without a calculator evaluate:
- $\cos(x)$
 - $\tan(x)$
 - $\sec(x)$
 - $\csc(x)$
4. After Theo used the motion detector, he used his distance-time graph to determine the following properties of his motion. However, he has lost a copy of his graph. Help him re-create a possible graph of his motion.
Details:
- His average velocity was 0.5 feet per second
 - He turned around twice.
 - He started while standing 3 feet from the motion detector and began to walk away from it at $t = 0$.
 - He walked a total of 9 feet during the 10-second interval.
5. Write the equation of the line parallel to $9y - 4x = 12$ through the point $(6, -7)$. Write the equation in *graphing form* as shown in the Math Notes box preceding problem 1-8.
6. Salima and Karim were driving from Sacramento to San Jose. Salima kept track of their rate as Karim drove. Below is a graph of their rate during the trip.



- What is the driving distance between Sacramento and San Jose?
 - What was Karim’s average speed?
7. [Challenge] Without using a calculator, determine the exact value of each of the following trig expressions.
- $\sin\left(\frac{5\pi}{6}\right)$

b. $\cos\left(\frac{-3\pi}{4}\right)$

c. $\tan\left(\frac{\pi}{3}\right)$

d. $\sec\left(\frac{5\pi}{3}\right)$

8. The height of a right circular cone is twice the radius. If the height of the cone is h , write an expression for the volume of the cone using only h .
9. The function $y = x^3 + 1$ is graphed below, along with four left endpoint rectangles which approximate the area under the curve from $x = -2$ to $x = 2$.
- Why does it look like there are only three rectangles?
 - Recall that area under the x -axis is negative, while area above the x -axis is positive. Approximate the area under the curve for $-2 \leq x \leq 2$ using these four rectangles.
10. The parabola $y = -(x - 3)^2 + 4$ is graphed below. Use four trapezoids of equal width to approximate the area under the parabola for $1 \leq x \leq 5$. Is this area an overestimate or an underestimate of the true area under the parabola? Explore this using the [Estimating Area Under a Curve eTool](https://www.desmos.com/calculator/l4okxd2kok) ([desmos.com/calculator/l4okxd2kok](https://www.desmos.com/calculator/l4okxd2kok)).

