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Due: Sat, Oct 3, 2020 12:00 PM CDT

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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**1. Question Details** LarCalcET7 3.7.011. [4057072]

The radius  $r$  of a circle is increasing at a rate of 7 centimeters per minute. Find the rate of change of the area when  $r = 38$  centimeters.

$\text{cm}^2/\text{min}$

**2. Question Details** LarCalcET7 3.7.013. [4056976]

The radius  $r$  of a sphere is increasing at a rate of 3 inches per minute.

(a) Find the rate of change of the volume when  $r = 9$  inches.

$\text{in.}^3/\text{min}$

(b) Find the rate of change of the volume when  $r = 37$  inches.

$\text{in.}^3/\text{min}$

**3. Question Details** LarCalcET7 3.7.021. [4057036]

A ladder 25 feet long is leaning against the wall of a house. The base of the ladder is pulled away from the wall at a rate of 2 feet per second.



(a) What is the velocity of the top of the ladder when the base is given below?

7 feet away from the wall  ft/sec

20 feet away from the wall  ft/sec

24 feet away from the wall  ft/sec

(b) Consider the triangle formed by the side of the house, ladder, and the ground. Find the rate at which the area of the triangle is changing when the base of the ladder is 20 feet from the wall.

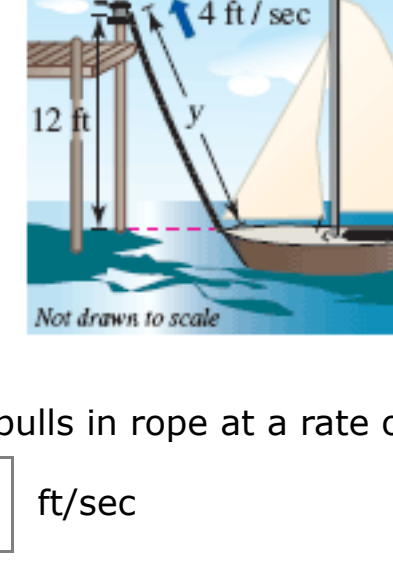
$\text{ft}^2/\text{sec}$

(c) Find the rate at which the angle between the ladder and the wall of the house is changing when the base of the ladder is 20 feet from the wall.

rad/sec

**4. Question Details** LarCalcET7 3.7.024. [4056714]

A boat is pulled into a dock by means of a winch 12 feet above the deck of the boat.



(a) The winch pulls in rope at a rate of 4 feet per second. Determine the speed of the boat when there is 37 feet of rope out.

ft/sec

What happens to the speed of the boat as it gets closer to the dock?

The speed of the boat  as it approaches the dock.

(b) Suppose the boat is moving at a constant rate of 4 feet per second. Determine the speed at which the winch pulls in rope when there is a total of 37 feet of rope out.

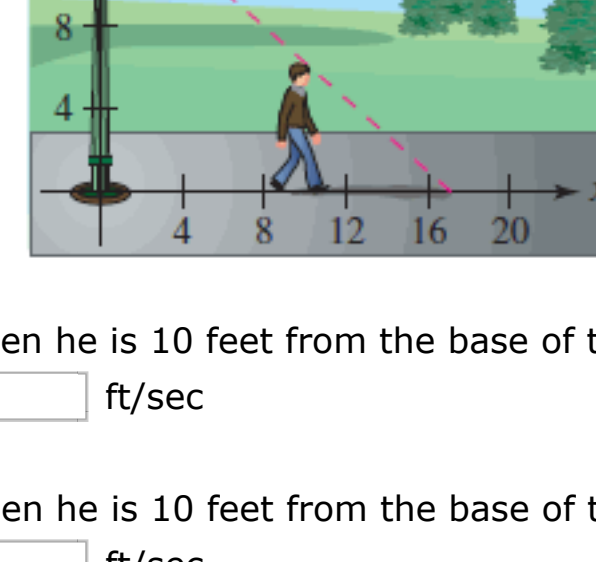
ft/sec

What happens to the speed at which the winch pulls in rope as the boat gets closer to the dock?

The speed at which the winch pulls in rope

**5. Question Details** LarCalcET7 3.7.029. [4056529]

A man 6 feet tall walks at a rate of 8 feet per second away from a light that is 15 feet above the ground (see figure).



(a) When he is 10 feet from the base of the light, at what rate is the tip of his shadow moving?

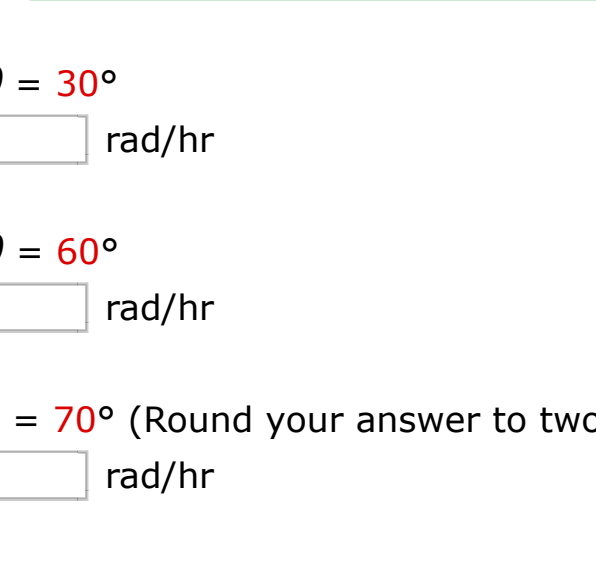
ft/sec

(b) When he is 10 feet from the base of the light, at what rate is the length of his shadow changing?

ft/sec

**6. Question Details** LarCalcET7 3.7.042. [4056500]

An airplane flies at an altitude of  $y = 7$  miles toward a point directly over an observer (see figure). The speed of the plane is 700 miles per hour. Find the rates (in radians per hour) at which the angle of elevation  $\theta$  is changing when the angle is  $\theta = 30^\circ$ ,  $\theta = 60^\circ$ , and  $\theta = 70^\circ$ .



(a)  $\theta = 30^\circ$

rad/hr

(b)  $\theta = 60^\circ$

rad/hr

(c)  $\theta = 70^\circ$  (Round your answer to two decimal places.)

rad/hr

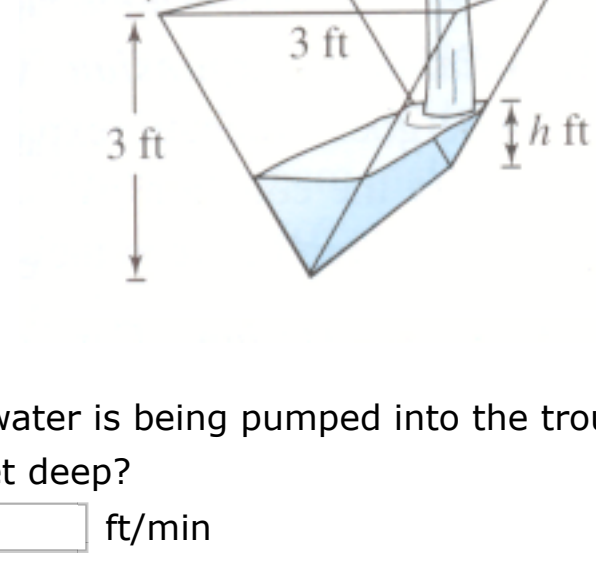
**7. Question Details** LarCalcET7 3.7.017.MI. [4498915]

At a sand and gravel plant, sand is falling off a conveyor and onto a conical pile at a rate of 14 cubic feet per minute. The diameter of the base of the cone is approximately three times the altitude. At what rate (in ft/min) is the height of the pile changing when the pile is 2 feet high? (Hint: The formula for the volume of a cone is  $V = \frac{1}{3}\pi r^2 h$ .)

$\frac{dh}{dt} =$   ft/min

**8. Question Details** LarCalcET7 3.7.020. [4056605]

A trough is 12 feet long and 3 feet across the top (see figure). Its ends are isosceles triangles with altitudes of 3 feet.



(a) If water is being pumped into the trough at 2 cubic feet per minute, how fast is the water level rising when  $h$  is 1.0 feet deep?

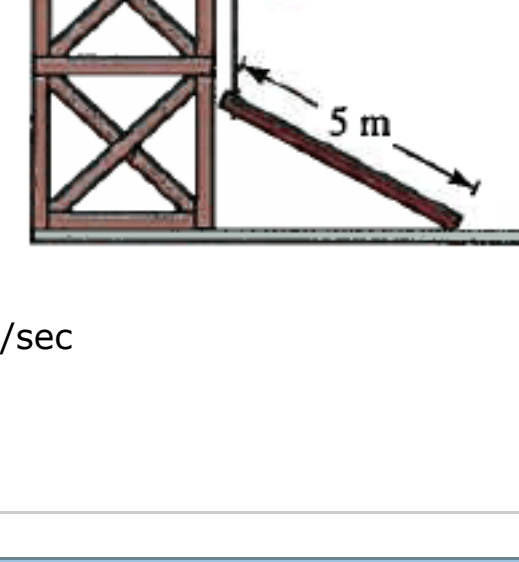
ft/min

(b) If the water is rising at a rate of  $3/8$  inch per minute when  $h = 2.5$ , determine the rate at which water is being pumped into the trough.

$\text{ft}^3/\text{min}$

**9. Question Details** LarCalcET7 3.7.022. [4057212]

A construction worker pulls a five-meter plank up the side of a building under construction by means of a rope tied to one end of the plank (see figure). Assume the opposite end of the plank follows a path perpendicular to the wall of the building and the worker pulls the rope at a rate of 0.21 meter per second. How fast is the end of the plank sliding along the ground when it is 2.0 meters from the wall of the building? (Round your answer to two decimal places.)



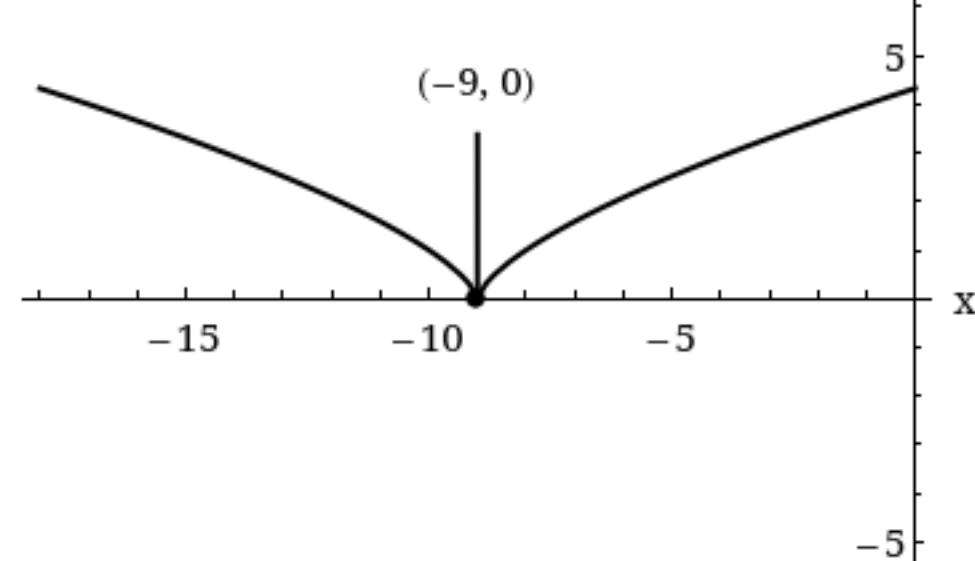
m/sec

**10. Question Details** LarCalcET7 4.1.009. [4056892]

Find the value of the derivative (if it exists) at the given extremum. (If an answer does not exist, enter DNE.)

$f(x) = (x + 9)^{2/3}$

$f'(-9) =$



**11. Question Details** LarCalcET7 4.1.015.MI. [4056952]

Find the critical numbers of the function. (Enter your answers as a comma-separated list.)

$f(x) = 5x^2 - 8x$

$x =$

**12. Question Details** LarCalcET7 4.1.029. [4057157]

Find the absolute extrema of the function on the closed interval.

$f(x) = x^3 - \frac{3}{2}x^2, [-5, 6]$

minimum  $(x, y) =$

maximum  $(x, y) =$

**13. Question Details** LarCalcET7 4.1.029.EP. [4497262]

Consider the following function and closed interval.

$f(x) = x^3 - \frac{3}{2}x^2, [-1, 4]$

Find  $f'(x)$ .

$f'(x) =$

Find the critical numbers of  $f$  in  $(-1, 4)$  and evaluate  $f$  at each critical number. (Order your answers from smallest to largest  $x$ , then from smallest to largest  $y$ .)

$(x, y) =$

$(x, y) =$

Evaluate  $f$  at each endpoint of  $[-1, 4]$ .

left endpoint  $(x, y) =$

right endpoint  $(x, y) =$

Find the absolute extrema of the function on the closed interval  $[-1, 4]$ .

minimum  $(x, y) =$

maximum  $(x, y) =$

**14. Question Details** LarCalcET7 4.1.044. [4059271]

Find the absolute extrema of the function on the closed interval.

$y = x^2 - 8 \ln x, [1, 5]$

minimum  $(x, y) =$

maximum  $(x, y) =$

**15. Question Details** LarCalcET7 4.1.047. [4056800]

Find the absolute extrema of the function (if any exist) on each interval. (If an answer does not exist, enter DNE.)

$f(x) = 4x - 10$

(a)  $[0, 5]$

minimum  $(x, y) =$

maximum  $(x, y) =$

(b)  $[0, 5]$

minimum  $(x, y) =$

maximum  $(x, y) =$

(c)  $(0, 5]$

minimum  $(x, y) =$

maximum  $(x, y) =$

(d)  $(0, 5)$

minimum  $(x, y) =$

maximum  $(x, y) =$

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