For a certain species of tree, the average height of the tree after 2 years is 3 feet, and after 6 years the height of the tree is 23 feet. Assume that the annual growth of the tree is linear for $2 \leq t \leq 20$.

(a) Find the annual rate of change of height of the tree in feet per year.

(b) Find a function for the height *h* of the the tree in feet as a function of time *t* in years.

(c) Find the domain of the function from part (b).

(d) How tall will the tree be after 18 years?

(e) After how many years will the tree be 29 feet tall?

Boat A leaves a dock headed due east at 3:00PM traveling at a speed of 14 mph. At the same time, Boat B leaves the same dock traveling due north at a speed of 11 mph. Find an equation that represents the distance d in miles between the boats and any time t in hours. ($d = rt$)

Boat A leaves a dock headed due east at 1:00PM traveling at a speed of 10 mph. At 5:00PM, Boat B leaves the same dock traveling due south at a speed of 24 mph. Find an equation that represents the distance d in miles between the boats and any time t in hours for $t \geq 4$, using that $t = 0$ corresponds to the time that Boat A leaves the dock. ($d = rt$)

A spherical balloon is being inflated so that radius is increasing at a rate of 9 mm/sec. $\left(SA = 4\pi r^2\right)$ $\left(V = \frac{4}{3}\pi r^3\right)$

(a) Find an expression for the surface area of the balloon S in square millimeters at any time t in seconds.

(b) Find an expression for the volume of the balloon V in cubic millimeters at any time t in seconds.

The volume of a conical pile of sand is increasing at a rate of $336\pi \text{cm}^3$/sec. The height *h* of the pile is always four times the radius *r*. Express the radius *r* in centimeters as a function of time *t* in seconds. $\left(V = \frac{1}{3}\pi r^2 h\right)$

A forest fire spreads outward from a central point in a circular path. The distance from the center of the fire to the outer edge of the fire is increasing at a rate of 13 feet per hour. Express the area encompassed by the fire, A in terms of time t in hours. $\left(A = \pi r^2 \right)$

The volume of a sphere is increasing at a rate of 21cm^3/minute. Express the radius r of the sphere in centimeters as a function of time t in minutes. $\left(V = \frac{4}{3}\pi r^3 \right)$

A conical tank of radius r = 7 feet and height of h = 11 feet is being filled with water at a rate of 4 ft^3/min. $\left(V = \frac{1}{3}\pi r^2 h\right)$

(a) Express the height h of the water in the tank, in feet, as a function of time t in minutes.

(b) What will the height of the water in the tank be after 12.6 minutes? Give your answer to two decimal places.

(c) After how many minutes will the height of the water level in the tank be 6.0 feet? Round your answer to two decimal places.