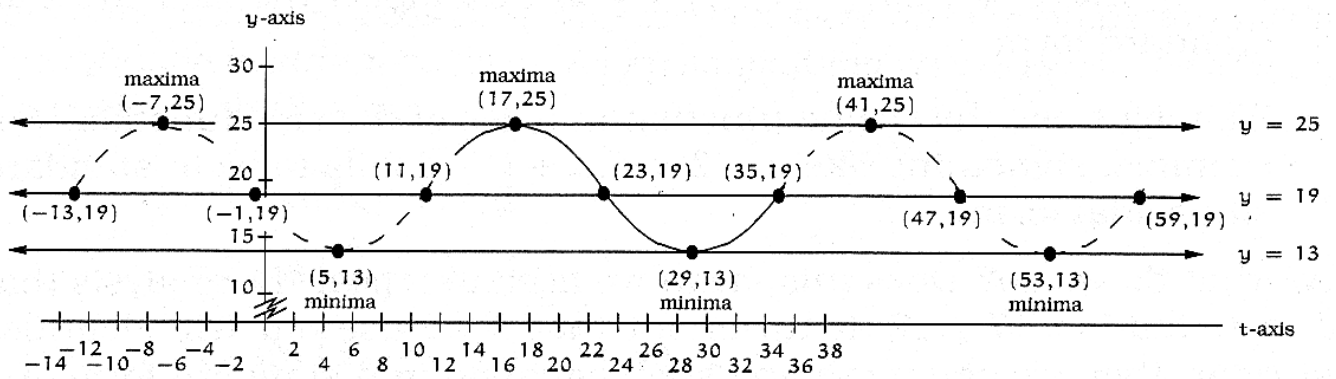


1 A sinusoidal curve $y = f(t)$ is shown.



(a) Give a function $f(t)$ for the curve using a cosine that has a positive coefficient in front of the cosine.

(b) Give a function $f(t)$ for the curve using a sine that has a positive coefficient in front of the sine.

2 Consider the vectors $\vec{a} = \langle 2, -3 \rangle$, $\vec{b} = \langle 1, 4 \rangle$.

(a) Calculate the magnitude of \vec{a} .

(b) Give a unit vector \vec{d} along the same direction as \vec{a} .

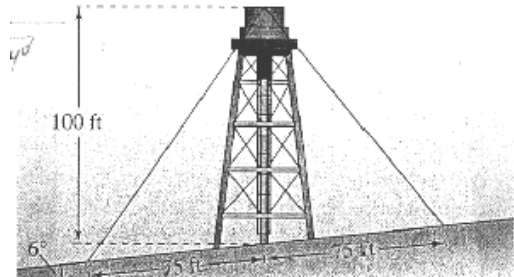
(c) Find the angle between \vec{a} and \vec{b} .

(d) Find the projection of \vec{a} onto \vec{b} .

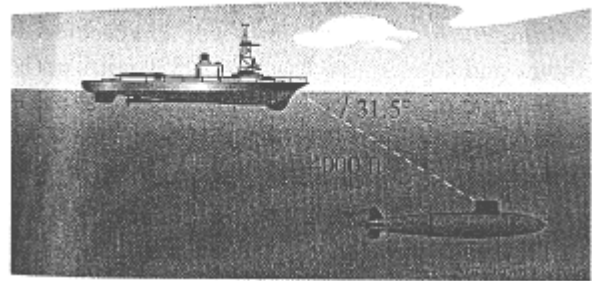
(e) Find a vector \vec{c} such that $\vec{a} - \vec{b} + 2\vec{c} = \vec{0}$.

3 $\cos^{-1}\left(\frac{x-2}{2}\right) = \arctan(?)$ if $2 < x < 4$?

- 4** A 100-foot vertical tower is to be constructed on the side of a hill that makes a 6° angle with the horizontal. Find the length of each of the two guy wires that will be attached 75 feet uphill and downhill from the base of the tower (see figure).



- 5** The sonar of a navy cruiser detects a submarine that is 4000 feet from the cruiser. The angle between the water level and the submarine is 31.5° . How deep is the submarine?



- 6** Give the seventh solution after $t = 0$. Check your answer by graphing on your calculator.

(a) $7 = 4 - 8 \cos(2t - 46)$

(b) $136 = 3 \tan(2 - 3t) + 1$

- 7** Write an algebraic expression (this means no trig functions) that is equivalent to $\csc\left(\arctan\left(\frac{x}{\sqrt{7}}\right)\right)$.