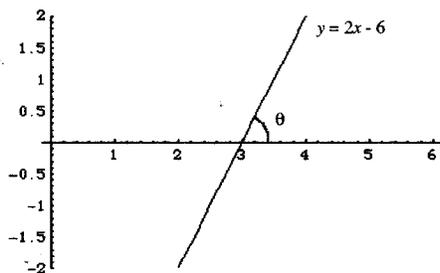


1. The line $y = 2x - 6$ intersects the x -axis and forms an angle measuring θ radians, as shown below. Find each of the following trigonometric function values without finding θ directly.

$$(a) \tan \theta = \frac{2}{1} = 2$$

$$(b) \sin \theta = \frac{2}{\sqrt{1+4}} = \frac{2}{\sqrt{5}}$$

$$(c) \cos \theta = \frac{1}{\sqrt{5}}$$



2. When an angle measuring α radians is placed in standard position (so that its vertex is at the origin and its initial side lies along the horizontal axis), its terminal side passes through the point $(2, 3)$. Find each of the following trigonometric function values without finding α directly.

$$(a) \sin \alpha = \frac{3}{\sqrt{4+9}} = \frac{3}{\sqrt{13}}$$

$$(b) \cos(\alpha + 2\pi) = \cos \alpha = \frac{2}{\sqrt{13}}$$

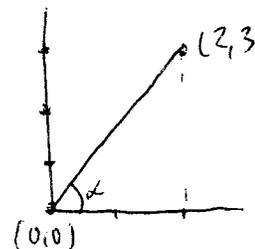
$$(c) \tan \alpha = 3/2$$

$$(d) \sin(-\alpha) = -\sin \alpha = -\frac{3}{\sqrt{13}}$$

$$(e) \cos(\alpha + \pi) = -\cos \alpha = -\frac{2}{\sqrt{13}}$$

$$(f) \sin(13\pi - \alpha) = \sin(\pi - \alpha) = \sin \alpha = \frac{3}{\sqrt{13}}$$

$$(g) \tan\left(\frac{3\pi}{2} - \alpha\right) = \frac{2}{3}$$



3. Decide whether each of the following functions is even, odd, or neither. (Recall that a function f is *even* if $f(-x) = f(x)$ for all x in its domain and *odd* if $f(-x) = -f(x)$ for all x in its domain.) You may graph the functions to check your work, but you should justify your answers algebraically.

(a) $f(x) = 1 + \cos x$ $f(-x) = 1 + \cos(-x) = 1 + \cos x$ even

(b) $f(x) = 1 + \sin x$ $f(-x) = 1 + \sin(-x) = 1 - \sin x$ neither

(c) $f(x) = \tan x$ $f(-x) = \frac{\sin(-x)}{\cos(-x)} = \frac{-\sin x}{\cos x} = -\tan x$ odd

(d) $f(x) = |\sin x|$ $f(-x) = |\sin(-x)| = |-\sin(x)| = |\sin x|$ even

(e) $f(x) = \sin 2x$ $f(-x) = \sin(-2x) = -\sin 2x$ odd

(f) $f(x) = \sin x + \cos x$ $f(-x) = \sin(-x) + \cos(-x) = -\sin x + \cos x$ neither

4. A typical person might have a pulse of 70 heartbeats per minute and a blood pressure reading of 120 over 80, where 120 is the high pressure and 80 is the low. Model blood pressure as a function of time using a sinusoidal function $B(t)$, where t is time in minutes.

- (a) What is the amplitude of $B(t)$?

$$\text{amplitude} = (120 - 80) / 2 = 20$$

- (b) What is the period of $B(t)$?

$$\text{period} = \frac{1}{70} \text{ minutes}$$

- (c) Write a possible formula for $B(t)$.

$$B(t) = 20 \sin(140\pi t)$$

$$\left(\frac{2\pi}{b} = \text{period} = \frac{1}{70} \right)$$

$$\text{so } b = 2\pi \cdot 70 = 140\pi$$