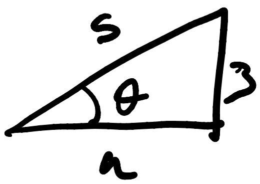
Trig Exam 2 Solutions

Monday, March 22, 2021 10:05 AM

Problem 1: $\tan\left(\sin^{-1}\left(\frac{3}{5}\right)\right)$

let $\theta = \sin^{-1}\left(\frac{3}{5}\right)$

then $\sin\theta = \frac{3}{5}$



put this on the triangle using SOHCAHTOA

Then, Pythag: $a^2 + 3^2 = 5^2$

$a^2 = 16$

$a = 4.$

Finally, using SOHCAHTOA again,

$\tan(\theta) = \frac{3}{4}$,

so $\boxed{\tan\left(\sin^{-1}\left(\frac{3}{5}\right)\right) = \frac{3}{4}}$.

Problem 2. $f(\theta) = 3\cos(\theta - \pi) + 1.$

Amplitude $= 3$

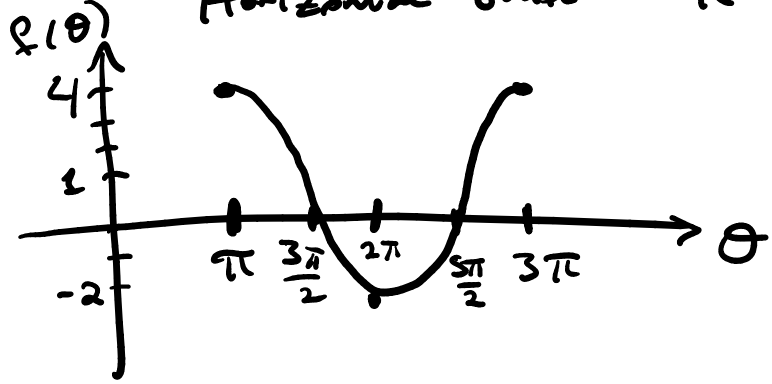
Period $= 2\pi$, since $B = 1$.

Vertical Shift = 1 <u>up</u>

Horizontal Shift = π to the <u>right</u>.

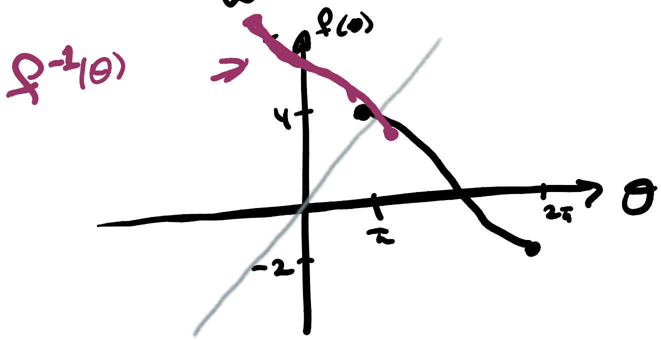
$f(\theta)$

Horizontal Shift = π to the right.

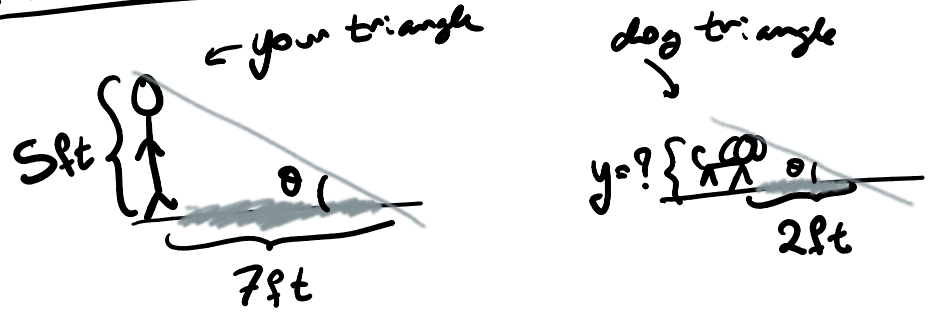


The function has zeros at $\frac{3\pi}{2}$ and $\frac{5\pi}{2}$, and no asymptotes.

Restrict domain to be from π to 2π, then we have



Problem 3



What the two triangles have in common is the angle of elevation up to the sun.

From the left triangle (the person)

$$\tan\theta = \frac{5}{7}.$$

$$\tan\theta = \frac{5}{7}.$$

From the triangle on the right (the dog),

$$\tan\theta = \frac{y}{2}.$$

That tells us

$$\frac{y}{2} = \frac{5}{7},$$

So $\boxed{y = \frac{10}{7} \text{ ft.}}$

Problem 4.

$$\frac{\cos\theta}{\cos\theta\cdot\cot\theta+\sin\theta} = \frac{\cos\theta}{\cos\theta\cdot\frac{\cos\theta}{\sin\theta}+\sin\theta}$$

defn of $\cot\theta$

$$= \frac{\cos\theta}{\frac{\cos^2\theta}{\sin\theta}+\sin\theta\cdot\frac{\sin\theta}{\sin\theta}}$$

to add fractions

$$= \frac{\cos\theta}{\quad}$$

$$= \frac{\cos\theta}{\frac{\cos^2\theta + \sin^2\theta}{\sin\theta}}$$

multiply by reciprocal

$$= \frac{\cos\theta \, \sin\theta}{\cos^2\theta + \sin^2\theta}$$

Pythag. identity.

$$= \frac{\cos\theta \, \sin\theta}{1}$$

$$= \boxed{\cos\theta \, \sin\theta.}$$

where is $\cos\theta \sin\theta = 1$?

There are many ways to approach this question, any reasonable approach will get credit.

<u>Option 1:</u> $\cos\theta$ & $\sin\theta$ are both always less than 1, so there is no value of θ that works.

<u>Option 2:</u> Guessing & checking values & finding that none work.