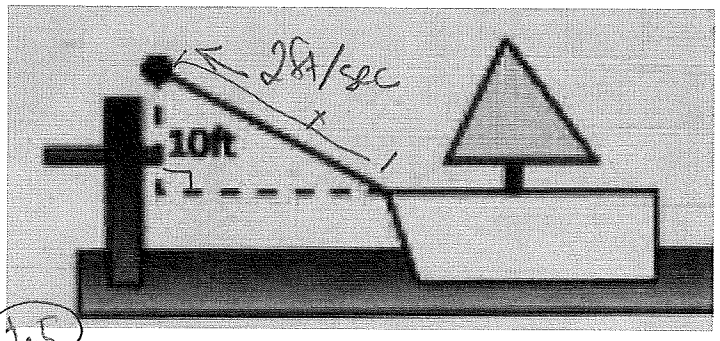
Quiz 4

Key

Show *all* your work. Reasonable supporting work must be shown to earn credit. There are *two* sides to this quiz.

1. [3] (§1.1 #116) A cable is attached to the bow of a sailboat that is initially 24 feet from the dock. The rope is drawn in over a pulley 10 feet higher than the bow at a rate of 2 feet per second. Find a function that gives the distance of the boat to the dock after t seconds.



Def variables (+.5)

@ $t=0$ $y=24$

$a^2+b^2=c^2$ (+.5)

$\Rightarrow 10^2+y^2=x^2$

$\Rightarrow y^2=x^2-100$

$\Rightarrow y=\pm\sqrt{x^2-100}$

dist is positive $\Rightarrow y=\sqrt{x^2-100}$ (+.5)

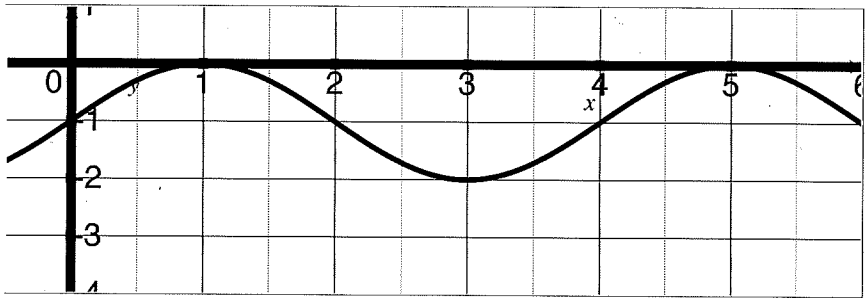
need this to be a function of time (t) ?

(+1) [note at $t=0$ $10^2+24^2=x^2$ $\Rightarrow x=26$

(+.5) [so $x=26-2t$

$\Rightarrow y=\sqrt{(26-2t)^2-100}$

2. [3] (WedbHW11 #21) Below is the graph of the sine function that has been horizontally stretched and vertically shifted. Find the equation for the graph.



(+.5) $\sin(Bx)+C$

$\sin(Bx)-1$ (+.5)

sin shifted down 1 $\Rightarrow$ $C=-1$

(+1) [period is 4π so $\frac{2\pi}{B}=4 \Rightarrow 2\pi=4\cdot B \Rightarrow \frac{2\pi}{4}=B \Rightarrow B=\frac{\pi}{2}$

so $\sin\left(\frac{\pi}{2}x\right)-1$

3. [2] Find:

(a) $\sin(\frac{\pi}{2})$

↑ y-value

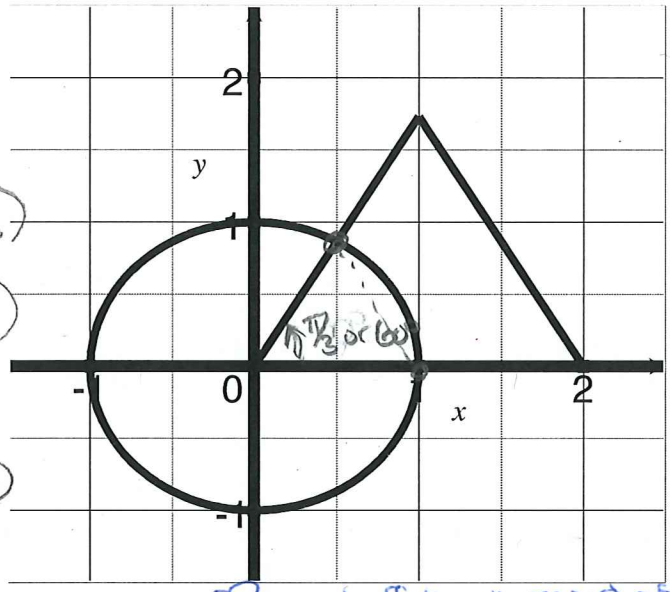
+.5 1 +.5

(b) $\tan(\frac{-3\pi}{4})$

↑ slope of terminal line

+.5 1 +.5

4. [3] (Circles & Angles Activity #4) Find the point(s) that are both on the unit circle and on the side of an equilateral triangle as shown below.



looking for $(\cos\frac{\pi}{3}, \sin\frac{\pi}{3})$

or $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ +1 +1

AND

$(1,0)$ +1

Could have done similar Δ's too..

OR read off the x-coord as ½ & use $x^2+y^2=1$ to find the y-coord.

OR

looking for (x,y) so that 1) $x^2+y^2=1$ AND the x-axis $\Rightarrow$ $(1,0)$ +1

2) $x^2+y^2=1$ (+.5) AND on the line thru $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ & $(0,0)$

$\Rightarrow$ slope $= \frac{\frac{\sqrt{3}}{2}-0}{\frac{1}{2}-0} = \sqrt{3}$

y-intercept @ 0

$\Rightarrow$ $y = \sqrt{3}x$ +.5

substitute into first +.5

$x^2+(\sqrt{3}x)^2 = 1 \Rightarrow x^2+3x^2=1 \Rightarrow 4x^2=1 \Rightarrow x=\pm\frac{1}{2}$

from graph $x = +\frac{1}{2}$ $\Rightarrow$ $y = \sqrt{3}\cdot\frac{1}{2}$ or $\frac{\sqrt{3}}{2}$ only +.5