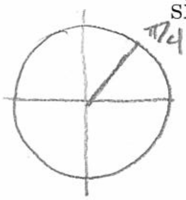
Quiz 6

Key

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.



1. [2] (WebHW11 #3) Find the *exact* value of the trigonometric functions at the given real number. Note: your calculator cannot do these for you.

$\sin\left(\frac{\pi}{4}\right)$ $\qquad$ $\cos\left(\frac{-5\pi}{6}\right)$ $\qquad$ $\cos\left(\frac{13\pi}{6}\right)$ $\qquad$ $\tan\left(\frac{2\pi}{3}\right)$

isoceles so the two side lengths are the same $\Rightarrow ?^2 + ?^2 = 1 \Rightarrow 2?^2 = 1 \Rightarrow ?^2 = \frac{1}{2} \Rightarrow ? = \sqrt{\frac{1}{2}}$ or $\frac{1}{\sqrt{2}}$ (+.5)

30°-60°-90° triangle and $\cos\left(-\frac{5\pi}{6}\right)$ is the long side so $\cos\left(-\frac{5\pi}{6}\right) = -\frac{\sqrt{3}}{2}$ (+.5) b/c in quad IV

note $\frac{13\pi}{6}$ is coterminal with $\frac{\pi}{6}$ so 30°-60°-90° △ $\Rightarrow \cos\left(\frac{13\pi}{6}\right) = \frac{\sqrt{3}}{2}$ (+.5)

$\dfrac{\sin\frac{2\pi}{3}}{\cos\frac{2\pi}{3}} = \dfrac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = -\sqrt{3}$ (+.5)

2. [3] (§5.2 #63/§6.2 #17) The angle θ is such that $\sin\theta = \frac{12}{13}$ and its terminal side is in quadrant two. Find the following:

$\cos\theta$ $\qquad\qquad$ $\tan\theta$

Recall $(\sin\theta)^2 + (\cos\theta)^2 = 1$ (+1) for all θ so...

$\left(\frac{12}{13}\right)^2 + (\cos\theta)^2 = 1$

$\Rightarrow (\cos\theta)^2 = 1 - \frac{144}{169} = \frac{25}{169}$

$\Rightarrow \cos\theta = \pm\sqrt{\frac{25}{169}}$ $\quad \frac{5}{13}$ or $-\frac{5}{13}$

b/c the terminal side is in quadrant 2 $\cos\theta$ is negative

so $-\frac{5}{13}$

sign (+.5) alg (+.5)

Recall $\tan\theta = \frac{\sin\theta}{\cos\theta}$ (+.5); from the left we know $\cos\theta$

so $\tan\theta = \dfrac{12/13}{-5/13} = \dfrac{-12}{5}$ alg (+.5)

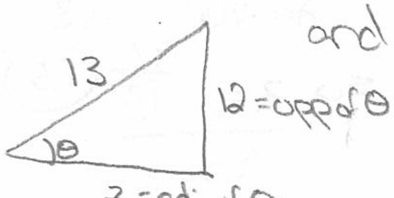
$13 \cdot 13 = 39 + 130 = 169$; $169 - 144 = 25$

or

Sohcahtoa $\Rightarrow$ the angle θ fits into the △ below (+1)

and $\cos\theta = \frac{z}{13}$.

made △ (+.5) sign (+.5) alg (+.5)



we can use Pythagorus to solve for z

$z^2 + 12^2 = 13^2 \Rightarrow z = 5$

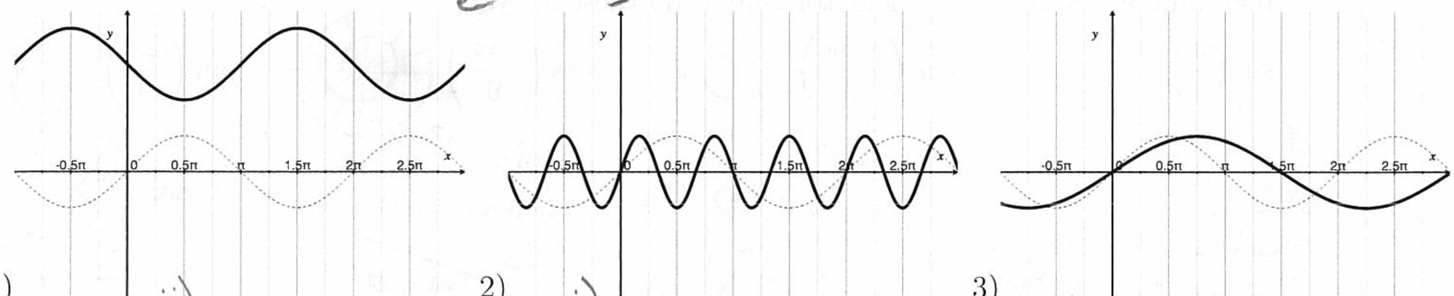
so $\cos\theta = -\frac{5}{13}$

the negative comes b/c we're in quadrant 2.

3. [2] (WebHW 11 #3 & §4.2 #38) Assume that A and B be a positive numbers greater than 1. Match the following functions to their corresponding graphs. Note that each graph has the dotted graph of $y = \sin(x)$ for reference.

i)$y = \sin(Ax)$ 2) ii)$y = -\sin(x) + A$ 1) iii)$y = \sin(\frac{x}{B})$ 3)

x.5 +1 x.5

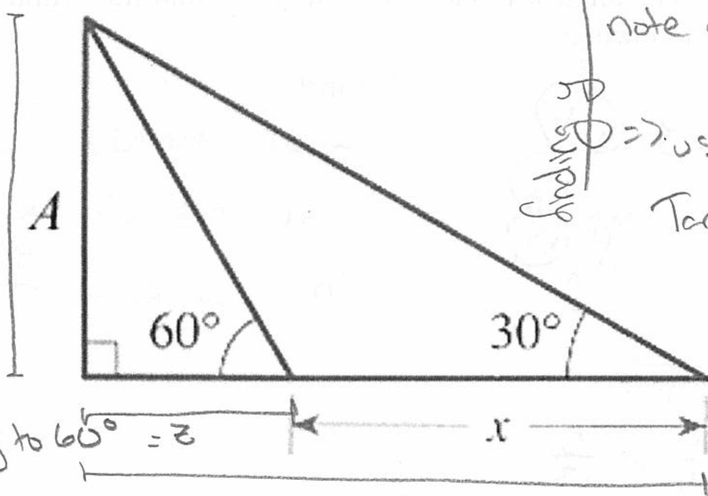


1) ii) 2) i) 3) iii

4. [3] (WebHW11 #17) Find the side labeled x in the picture below where A is 93 units long. Note, the diagram is *not* drawn to scale.

Sohcahtoa used correctly (+1)

opp to 30° = 93
opp to 60° =



adj to 60° = z

y = adj to 30°

finding y: note we have opp to 30° and want adj to 30°
=> use Tan

$\tan 30^\circ = \frac{93}{y}$

$\Rightarrow y = \frac{93}{\tan 30^\circ} = \frac{93}{\frac{1}{\sqrt{3}}}$

so $y = 93\sqrt{3}$ (+.5)
≈ 161.1

finding z: note we have opp to 60° & we want adj to 60°
=> use tan

$\tan 60^\circ = \frac{93}{z}$

$\Rightarrow z = \frac{93}{\tan 60^\circ} = \frac{93}{\sqrt{3}}$

so $z = \frac{93}{\sqrt{3}}$ (+.5)
≈ 53.7

started (+.5)
plan (+.5)

Notice $x = y - z$ so if we find $y + z$ we'll be able to do the problem.

From the work on the right.

$x = 93\sqrt{3} - \frac{93}{\sqrt{3}} = \frac{279}{\sqrt{3}} - \frac{93}{\sqrt{3}} = \frac{186}{\sqrt{3}}$

$93 \times 3 = 279$

So $x = \frac{186}{\sqrt{3}} \approx 107.4$