Key

Quiz 4

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

1. The maximum afternoon temperature T in a city was modeled by the formula $T = 75 - 10\cos(\frac{x\pi}{6})$, where January corresponds to $x = 1$.

   (a) [1] (WebHW11 #16) What is the maximum afternoon temperature in March?

   ie what is T when $x = 3$ (.5)

   $$T = 75 - 10\cos\left(\frac{3\pi}{6}\right)$$
   $$= 75 - 10\cos\left(\frac{\pi}{2}\right)$$
   $$= 75 - 10\cdot 0 \qquad \boxed{75} \qquad \boxed{+.5}$$

   (b) [1] What is the period of this function?

   normal period is 2π

   speeding up by $\pi/6$ so $\frac{2\pi}{\pi/6} = 2\pi \cdot \frac{6}{\pi} = 12$ (+1)

   which makes sense? the period should correspond to the calendar year?

2. [3] (TrigDefActivity #3) Let $\pi < \theta < \frac{3\pi}{2}$ and $\cos(\theta) = -\frac{8}{17}$. Find the exact (fraction) value of $\sin(\theta)$.

   inputs/outputs (.5)

   Recall $\sin^2\theta + \cos^2\theta = 1$ (.5)   or   Sohcahtoa $\Rightarrow \cos\theta = \frac{adj}{hyp}$

   $\Rightarrow \sin^2\theta + \left(-\frac{8}{17}\right)^2 = 1$ (.5)

   $\Rightarrow \sin^2\theta = 1 - \frac{64}{17^2}$
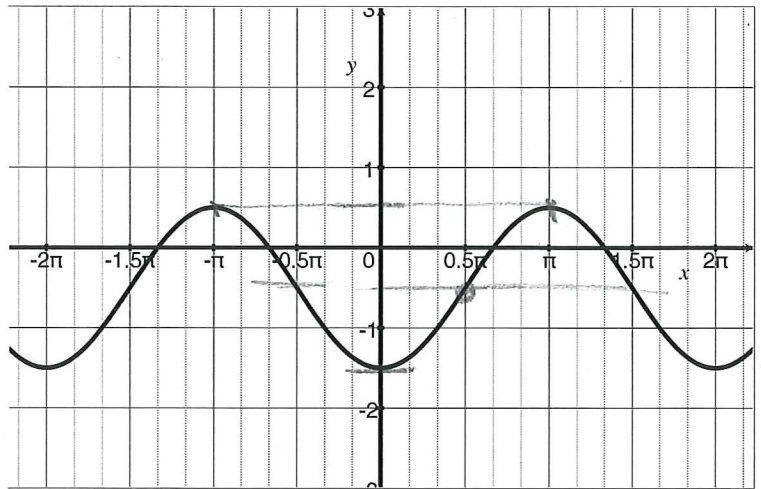
   $\sin^2\theta = \frac{225}{17^2}$ (+1)

   $\Rightarrow \sin\theta = \frac{\pm 15}{17}$ b/c in quad 3

   Sign (.5) 1

   $\sin\theta = \frac{-15}{17}$

3. The graph of f shown on the right is a trigonometric function.

(a) [1] (TrigTransform #4)
What is the amplitude of f?

$$\approx \frac{2}{2} \quad \text{so } 1$$

(b) [2] (WebHW12 #7) Find the equation for the graph of f.

cos upside down so $-\cos \theta$

shifted down $\frac{1}{2}$ so $-\cos\theta - \frac{1}{2}$

period is 2π so no worries about horiz. Sketches :)

(+5) (+5) (+5) (+5)

$$\boxed{-(\cos x) - \frac{1}{2}}$$

(c) [2] Find a second, *distinct or different* answer for part c.

cos shifted down $\frac{1}{2}$ so $\cos\theta - \frac{1}{2}$

shifted RIGHT π so $\boxed{\cos(\theta - \pi) - \frac{1}{2}}$

————— OR —————

cos shifted down $\frac{1}{2}$ so $\cos\theta - \frac{1}{2}$

shifted LEFT π so $\boxed{\cos(\theta + \pi) - \frac{1}{2}}$

————— or —————

Sin shifted down $\frac{1}{2}$ so $\sin\theta - \frac{1}{2}$

shifted RIGHT $\pi/2$ so $\boxed{\sin(\theta - \frac{\pi}{2}) - \frac{1}{2}}$

————— OR —————

sin shifted down $\frac{1}{2}$ so $\sin\theta - \frac{1}{2}$

shifted LEFT $\pi/2$ + vert. flipped

$$\boxed{-\sin(\theta + \frac{\pi}{2}) - \frac{1}{2}}$$

(+.5) consistent w/ 3b
(+.5) vert shift/amp
(x1) horiz shift/stretch

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