Student: ____________ **Date:** ____________	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 6.3 Classwork Day 1

1. If $f(x) = \mathbf{cos}\,(x)$ and $f(a) = \frac{1}{3}$, find the exact value of the following.

(a) $f(-a)$
(b) $f(a) + f(a + 2\pi) + f(a + 4\pi)$

(a) $f(-a) =$ ____________ (Type the value as a reduced fraction.)

(b) $f(a) + f(a + 2\pi) + f(a + 4\pi) =$ ____________ (Type the value as a reduced fraction.)

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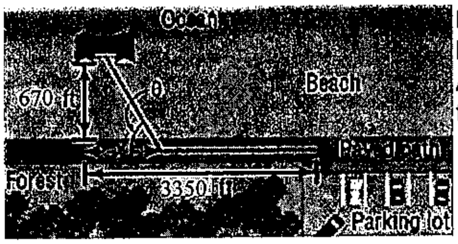
2. 

From a parking lot you want to walk to a house on the ocean. The house is located 3350 ft down a paved path that parallels the beach, which is 670 ft wide. Along the path, you can walk 350 ft/min, but on the beach you can only walk 130 ft/min. Calculate the time T if you walk directly from the parking lot to the house.

The time T to get from the parking lot to the beach-house can be expressed as a function of the angle θ shown in the illustration and is equal to the following.

$$T(\theta) = \frac{67}{7} - \frac{67}{35\,\mathbf{tan}\,\theta} + \frac{67}{13\,\mathbf{sin}\,\theta}, \qquad 0 < \theta < \frac{\pi}{2}$$

You must calculate the time T if you walk directly from the parking lot to the house. Use the following hint.

Hint: $\mathbf{tan}\,\theta = \frac{670}{3350}$.

T = ____________ minutes (Type an integer or a fraction with a radical if needed.)

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3. Show that the period of $f(\theta) = \sin\theta$ is 2π.

If $f(\theta + p) = f(\theta)$ and p is the smallest such number then this smallest value is called the (fundamental) period of f. We will prove that the period of $f(\theta) = \sin\theta$ is 2π by contradiction. So, suppose that there is a number p other than 2π, such that

$f(\theta + p) = f(\theta)$, then $0 < p$ (1) __________ 2π.

Thus, $\sin(\theta + p) = \sin\theta$ for all θ. Let θ be 0.

$\sin(\theta + p) = \sin\theta$

$\sin(0 + p) = \sin 0$ Substitute 0 for θ.

$\sin(p) =$ __________ Simplify.

For what value of p is the above equation true?

p = __________

Now, substitute $\frac{\pi}{2}$ for θ and the value found above for p in the equation $\sin(\theta + p) = \sin\theta$. (Simplify your answer.)

$\sin(\theta + p) = \sin\theta$

$\sin($__________$) = \sin\frac{\pi}{2}$ Add inside the parentheses.

__________ $= \sin\frac{\pi}{2}$ Evaluate the expression on the left side.

Thus, the assumption of existence of a number p other than 2π, such that $f(\theta + p) = f(\theta)$ and $0 < p < 2\pi$ results into the above equation. Is this equation true?

- ○ No
- ○ Yes

Does this prove that the period of $f(\theta) = \sin\theta$ is 2π?

- ○ **A.** Yes because it is proved that it is not possible to have a period value such that $0 < p < 2\pi$.
- ○ **B.** No, this proves that the period of $f(\theta) = \sin\theta$ cannot be less that 2π. However there is a possibility that it can be greater than 2π.

(1) ○ $<$
○ $>$

1. $\frac{1}{3}$

   1

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2. $\frac{67}{13}\sqrt{26}$

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3. (1) $<$

   0

   π

   $\frac{3\pi}{2}$

   -1

   No

   A. Yes because it is proved that it is not possible to have a period value such that $0 < p < 2\pi$.

6.3 classwork day 1

① $f(x) = \cos(x)$

$f(a) = \frac{1}{3}$

a) $f(-a) = \cos(-1/3) = \boxed{\frac{1}{3}}$

$* \cos(-\theta) = \cos(\theta)$

b) $f(a) + f(a+2\pi) + f(a+4\pi)$

$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \boxed{1}$

* add 2π to get same point on graph

② $\tan\theta = \frac{67}{7} - \frac{67}{35\tan\theta} + \frac{67}{13\sin\theta}$ $\quad 0 < \theta < \pi/2$

$* \tan\theta = \frac{670}{3350} = \frac{y}{x} = \frac{1}{5}$ [illegible]

$= \frac{1}{5}$

$x^2 + y^2 = r^2$

$5^2 + 1^2 = r^2 \quad r = \sqrt{26}$

$* \sin\theta = \frac{1}{\sqrt{26}} = \frac{y}{r}$

$$\frac{67}{7} - \frac{67}{35\left(\frac{1}{5}\right)} + \frac{67}{13\left(\frac{1}{\sqrt{26}}\right)} = \boxed{\frac{67\sqrt{26}}{13}}$$

6.3 classwork day 1 continued

(3) show period of $f(\theta) = \sin\theta$ is 2π

$f(\theta + p) = f(\theta)$, then $0 < p < 2\pi$

$\sin(\theta + p) = \sin\theta$ for all θ.

* Let θ be 0

$\sin(\theta + p) = \sin\theta$

$\sin(0 + p) = \sin 0$

$\sin p = 0$ $\quad p = \pi$

$\sin\pi = 0$

* sub $\pi/2$ for θ

$\sin(\theta + p) = \sin\theta$

$\sin(\pi/2 + \pi) = \sin\pi/2$

$\sin 3\pi/2 = \sin\pi/2$

$-1 = \sin\pi/2 \longrightarrow \sin\pi/2 = 1$

contradict

equation not true

A proved not possible to have a period value such that $0 < p < 2\pi$