

This white-pages test has problems 1 – 11. Take a moment to make sure you have them all.

No Calculators Allowed; No Reference Materials; Just You and Your Pencil and Eraser.

- 1 Quickly fill in the table with the exact values of the trigonometric functions for the given clock-face angles:

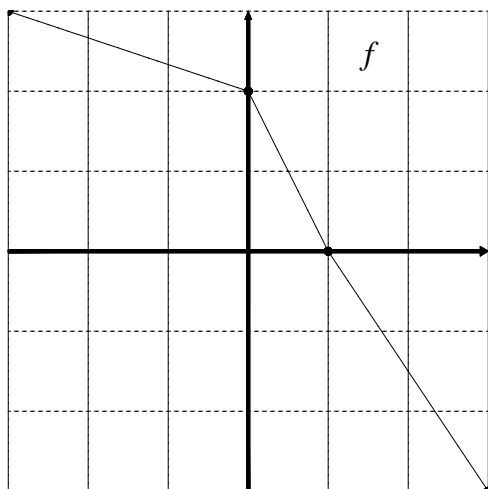
Hour	θ rad	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$
3 PM				
2 PM				
1:30 PM				
1 PM				
12 noon				

- 2 Fill in the table with the exact values for the missing entries:

Hour	θ rad	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$
		$\frac{-\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	
			$\frac{1}{2}$	$-\sqrt{3}$

- 3 Find the trigonometric form of the complex number $-\frac{3}{2} + \frac{\sqrt{3}}{2}i$

4 Consider the graph of f shown.



(a) Make a sign-change chart for the expression $f(x)f^{-1}(x)$ on the interval $[-3, 3]$.

(b) Make a sign-change chart for the expression $f(f^{-1}(x))$ on the interval $[-3, 3]$.

5 Show steps in simplifying the trigonometric expression:

$$\frac{\cos(x)}{1 - \sin(x)} - \frac{1 + \sin(x)}{\cos(x)}$$

6 Give a proof, which “flows” from one side to the other, of the identity

$$\frac{\cos(x)}{\cos(x) - \sin(x)} - \frac{\sin(x)}{\cos(x) + \sin(x)} = \sec(2x)$$

7 Let $\theta \in \left[-\frac{3\pi}{2}, -\pi\right]$ and $\sin(\theta) = \frac{12}{13}$. Show steps in computing the following:

(a) $\cos(\theta) =$ _____

(c) $\cos(2\theta) =$ _____

(b) $\sin(2\theta) =$ _____

(d) $\sin(\theta/2) =$ _____

8 Consider the functions

$$f(x) = 8 \cos \left(3x + \frac{\pi}{6} \right)$$

$$g(x) = 8 \cos \left(3\pi x + \frac{\pi}{6} \right)$$

On separate graphs, show one cycle of each of the functions, labeling salient points with their coordinates.

9 Let $K(x) = \left(x - \frac{\pi}{3}\right) \cos(x)$. Make a sign-change chart for $K(x)$ for $x \in [0, 2\pi]$.

10 Give right-hand sides for the identities:

(a) $\sin(x) \cos(y) + \cos(x) \sin(y) =$ _____

(b) $\sin(x) \sin(y) + \cos(x) \cos(y) =$ _____

(c) $\sin(x) \cos(x) =$ _____

(d) $1 + \tan(\theta)^2 =$ _____

(e) $\tan(x + y)[1 - \tan(x) \tan(y)] =$ _____

(f) $1 - 2 \sin(y)^2 =$ _____

- 11 Derive (that is, prove) either the formula for $\cos(\alpha - \beta)$ or the formula for $\cos(\alpha + \beta)$. You may assume only the basic unit-circle definitions of the sine and cosine.