

Math 115 Carter Sample Test 3

1. Simplify $\sin(A + B) - \sin(A - B)$.
2. Use the facts that $\sin\left(\frac{\pi}{12}\right) = \frac{\sqrt{2-\sqrt{3}}}{2}$ and $\cos\left(\frac{\pi}{12}\right) = \frac{\sqrt{2+\sqrt{3}}}{2}$ to determine the values of the six trigonometric functions at the angle $\frac{5\pi}{12}$.

3. Verify the identity:

$$\frac{1 - \cos x}{\sin x} = \frac{\sin x}{1 + \cos x}$$

Hint: Use the Pythagorean Theorem.

4. Verify the identity:

$$\frac{\sin x + \cos x}{\sec x + \csc x} = \frac{\sin x}{\sec x}$$

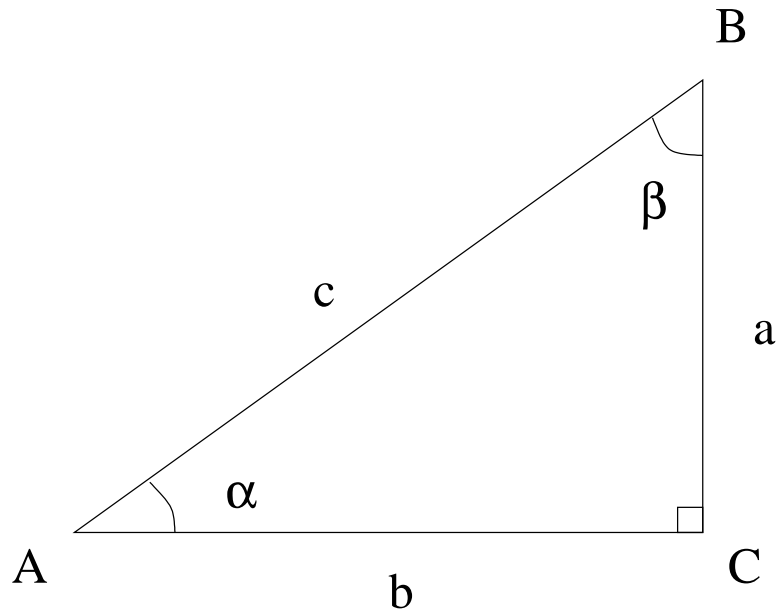
5. Compute the exact value of $\operatorname{Arccot}(-\sqrt{3})$ as an angle in radians.
6. Evaluate $\arcsin(\cos(\frac{5\pi}{6}))$
7. Use the graphing capabilities of your calculator to approximate the solutions (that are in the interval $[0, 2\pi]$) to the equation:

$$x \cos x - 2 = 0$$

8. Find all solutions for $0 \leq x < 2\pi$,

$$3 \sin^2 x = 3 \sin x + 2$$

9. Solve the triangle, if possible: $A = 131^\circ$; $C = 23^\circ$; $b = 10$
10. Solve the triangle, if possible: $C = 28^\circ 43'$; $a = 6M$; $b = 9M$



11. Referring to the triangle depicted above give the definitions of the 6 trigonometric functions of the angle α .
12. Assume the figure is not to scale to fill in the following tables.

α	β	a	b	c
20°	?	5	?	?
$\frac{\pi}{3}$?	4	?	?
?	$\frac{\pi}{4}$	$\sqrt{2}$?	?
?	53°	20	?	?
?	?	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$?

angle = θ	$\sin \theta$	$\cos \theta$	$\tan \theta$	$\sec \theta$	$\csc \theta$	$\cot \theta$
$\theta = \alpha = 65^\circ$?	?	?	?	?	?
$\theta = \beta = 25^\circ$?	?	?	?	?	?
$\theta = \alpha = \frac{\pi}{6}$?	?	?	?	?	?
$\theta = \beta = \frac{\pi}{6}$?	?	?	?	?	?
$\theta = \alpha = 72^\circ$?	?	?	?	?	?
$\theta = \beta = 12^\circ$?	?	?	?	?	?

13. For each angle in the preceding table, assume that $b = 5$ and find the remaining sides.
14. For each angle in the preceding table, assume that $a = 5$ and find the remaining sides.
15. For each angle in the preceding table, assume that $c = 5$ and find the remaining sides.
16. For each of the following functions (*10 points each function*): **Indicate your answers clearly!**

- Determine the amplitude;
- Determine the point at which the cycle begins;
- Determine the point at which the cycle ends;
- Determine the y -intercept;
- Sketch the graph and include at least two full cycles.

(a) $y = -3 \cos(x)$

(b) $y = \cos(3x)$

(c) $y = 5 \cos\left(\frac{\pi}{2} - x\right) + 10$

(d) $y = \tan\left(x - \frac{\pi}{4}\right)$

(e) $y = 15 \csc(2\pi x)$

(f) $y = 3 \sin(\pi x)$

(g) $y = -2 \cos\left(3x - \frac{\pi}{2}\right)$

(h) $y = \tan 4x$

(i) $y = 5 \csc 2\pi x$