

Show all your work for full credit. Unsupported answers = reduced points. Please write neatly and use a pencil please.

1. Prove the identity:  $\frac{\sin(2x)}{\sin(x)} - \frac{\cos(2x)}{\cos(x)} = \sec(x)$

[ \_\_\_\_\_ /5]

---

2. Prove the identity:  $\frac{1}{1-\sin^2(x)} = 1 + \tan^2(x)$

[ \_\_\_\_\_ /5]

3. Find the exact value of  $\cos(\tan^{-1}(\frac{3}{7}) + \sin^{-1}(\frac{2}{5}))$ .

[ /5]

---

4. Find an algebraic expression for  $\sin(2 \cos^{-1}(\frac{x}{3}))$

[ /5]

---

5. Use the substitution  $x = 5 \sec(\theta)$  to simplify the expression  $\frac{\sqrt{x^2-25}}{x}$ .

[ /5]

---

6. Write the function  $f(x) = 12 \sin(2x) - 5 \cos(2x)$  as a single sine function with  $0 \leq \phi < 2\pi$  (rounded to three decimal places.)

[ /5]

---

7. Solve the trigonometric equation for **all** solutions.

$$\sqrt{2} \cos(3x) + 1 = 0$$

\

[ /5]

---

8. Find the solutions for the equation on the interval  $[0, 2\pi)$ . You must solve it algebraically for credit. Round answers to 4 decimal places.

$$2 \tan^2(x) = 7 \tan(x) + 4$$

[ /5]

---

9. Use a power reducing formula to find the exact value of  $\cos^2(165^\circ)$

[ /5]

---

10. Consider the two expressions: (a)  $\sin(\sin^{-1}(7))$  and (b)  $\sin^{-1}(\sin(7))$ . Neither equals 7. Explain why.

[ /5]

---

**Extra Credit:** Find all the solutions to the equation  $8.6 \sin(2x + 3) = 5.59$  on the interval  $[0, 2\pi)$ . Round to 4 decimal places. Show your work.