

Math 130 - Test 2
October 9, 2019

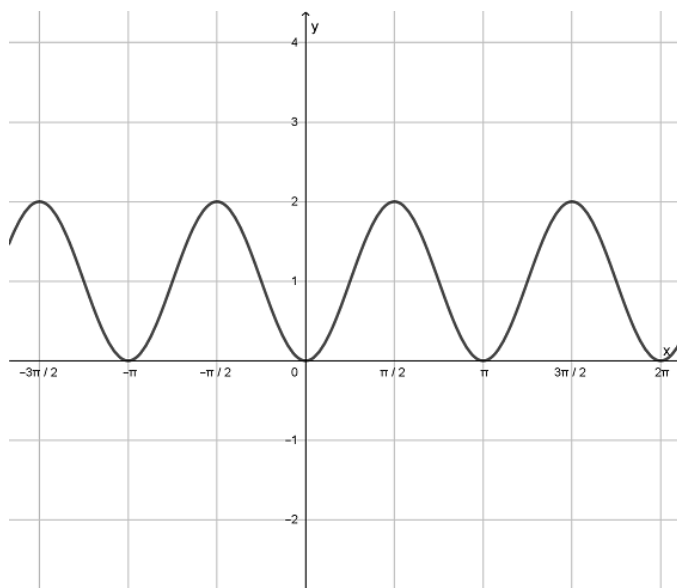
Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary. When finding exact answers, simplify as much as possible. You may use your unit circle and trig identity card on any problem unless otherwise indicated.

1. (5 points [5]) Determine the locations of two consecutive asymptotes of the graph of $y = 1 + 2 \tan(3x + \frac{\pi}{4})$.

2. (5 points [5]) Shown below is the graph of $y = 1 - \sin(2x + \frac{\pi}{2})$. Use the given graph to sketch the graph of $y = 1 - \csc(2x + \frac{\pi}{2})$. Clearly indicate any special features of the graph such as asymptotes, intercepts, etc.

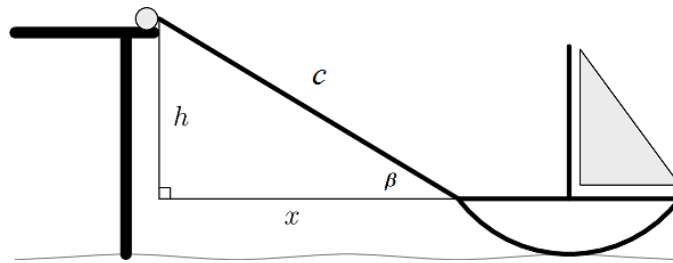


3. (5 points [5]) At which x -values does the graph of $y = \csc x$ have vertical asymptotes? Describe **all** such x -values.

4. (8 points [5]) On the attached graph paper, sketch a careful and detailed graph of $y = \frac{1}{2} \sec(x - \frac{\pi}{4})$. Include two full periods and be sure to label your axes.
5. (10 points [1,10]) Use your knowledge of the values of the trigonometric functions at special angles to determine the exact value of each of the following. Do not use a calculator.
- (a) $\tan^{-1} \sqrt{3}$
- (b) $\arccos \left(\frac{-\sqrt{3}}{2} \right)$
- (c) $\sin^{-1} \left(-\frac{1}{2} \right)$
- (d) $\cos^{-1} 0$
- (e) $\arcsin \sqrt{5}$
6. (2 points [1,10]) Determine the exact value of $\cos^{-1}(\cos 13\pi/6)$.

7. (5 points [1,2,10]) Use a right triangle to find the exact value of $\cos(\tan^{-1}(5/9))$.

8. (4 points [1,2,10]) A boat is being pulled toward a dock as shown in the figure below. Determine the angle β if $h = 6$ ft and $c = 22$ ft. Give your answer in degree measure, rounded to the nearest tenth of a degree.



9. (3 points [10]) Explain how the graph of $y = \sin^{-1} x$ can be obtained from the graph of $y = \sin x$.

10. (3 points [3]) Simplify the expression: $\cos x \sin^2 x - \cos x$

11. (3 points [3]) Rewrite and factor: $\sec^2 x + 5 \tan x - 1$

12. (5 points [3]) Rewrite $\frac{1}{1 + \sin x}$ so that it is not in fractional form.
(Your final answer should contain only tangents and secants.)

13. (4 points [3]) Verify the identity: $(\sec^2 x - 1)(\sin^2 x - 1) = -\sin^2 x$

14. (6 points [3]) Verify the identity: $\csc \theta + \cot \theta = \frac{\sin \theta}{1 - \cos \theta}$

15. (4 points [3]) Use a right triangle to show that $\tan(\sin^{-1} x) = \frac{x}{\sqrt{1-x^2}}$.

16. (8 points [3,5]) In this problem, you will establish the trig identity $\cos\left(x - \frac{\pi}{2}\right) = \sin x$.

(a) Draw a rough sketch of the graph of $y = \cos x$.

(b) Explain how the graph of $y = \cos\left(x - \frac{\pi}{2}\right)$ can be obtained from the graph of $y = \cos x$.

(c) Thinking graphically, explain why it must be true that $\cos\left(x - \frac{\pi}{2}\right) = \sin x$.

17. (4 points [9]) Find the exact solutions: $\cos x = \frac{1}{2}$.
(Find all solutions.)

18. (6 points [9]) Find the exact solutions: $4 \sin^2 x - 3 = 0$
(Find all solutions.)

19. (6 points [9]) Find the exact solutions in the interval $[0, 2\pi)$: $2 \sin^2 x - 3 \sin x + 1 = 0$

20. (4 points [6,9]) Adrianna correctly solved the equation $\sin x = \frac{1}{2}$. She found that $x = \frac{\pi}{6} + 2k\pi$ or $x = \frac{5\pi}{6} + 2k\pi$, where k is any integer. Use Adrianna's work to solve $\sin 5t = \frac{1}{2}$.

