

Midterm 2 (100 pts.)

Name: _____

True or False (3 pts. each)

Answer the following by circling TRUE or FALSE. If the answer is false you must explain why in the space provided for full credit.

1.) T F _____ For all real numbers x , $-1 \leq \cos x \leq 1$

2.) T F _____ The period of $y = \cot x$ is 2π .

3.) T F _____ $\sin^2 x - \cos^2 x = 1$

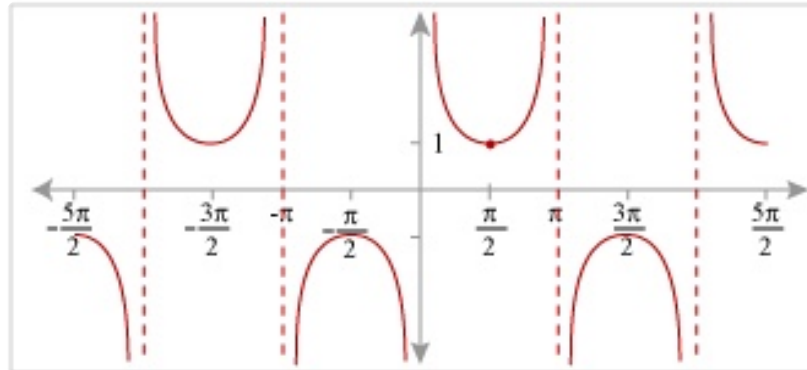
4.) T F _____ $\csc(-x) = -\csc x$

5.) T F _____ The graph of $y = \sin x$ has x intercepts at $x = k\pi$ where k is an integer.

Multiple Choice (5 pts. each)

6.) Which equation best describes the graph?

- (a) $y = \sin x$
- (b) $y = \cos x$
- (c) $y = \tan x$
- (d) $y = \csc x$
- (e) $y = \sec x$
- (f) $y = \cot x$



7.) Find the max and min of $y = -3 + 10 \tan x$.

- (a) Max: 7 Min: -13
- (b) Max: 13 Min: -7
- (c) Max: -40 Min: -13
- (d) DNE

8.) Simplify the following expression completely: $\frac{\cos\left(\frac{\pi}{2} - x\right)}{\sin\left(\frac{\pi}{2} - x\right)}$

- (a) $y = \sin x$
- (b) $y = \cos x$
- (c) $y = \tan x$
- (d) $y = \csc x$
- (e) $y = \sec x$
- (f) $y = \cot x$

9.) The product $\cos(75^\circ)\sin(15^\circ)$ can be written as an expression of the form

$$\frac{1}{2} \left[\sin A - \sin B \right].$$

What are A and B ?

(a) $A = 90^\circ, B = 60^\circ$

(b) $A = 60^\circ, B = 90^\circ$

(c) $A = 150^\circ, B = 30^\circ$

(d) $A = 30^\circ, B = 150^\circ$

10.) The exact value of $\sin(195^\circ) + \sin(105^\circ)$ is given by computing an expression of the form

$$2 \sin A \cos B.$$

What are A and B ?

(a) $A = 195^\circ, B = 105^\circ$

(b) $A = 300^\circ, B = 90^\circ$

(c) $A = 150^\circ, B = 45^\circ$

(d) $A = 45^\circ, B = 150^\circ$

Short Answer (10 pts. each)

11.) Find the exact value of $\tan(22.5^\circ)$.

12.) Find the exact value of $\cos(x - y)$ if $\sin x = -\frac{2}{3}$, $\cos y = \frac{\sqrt{5}}{3}$, x is in Quadrant III, and y is in Quadrant IV.

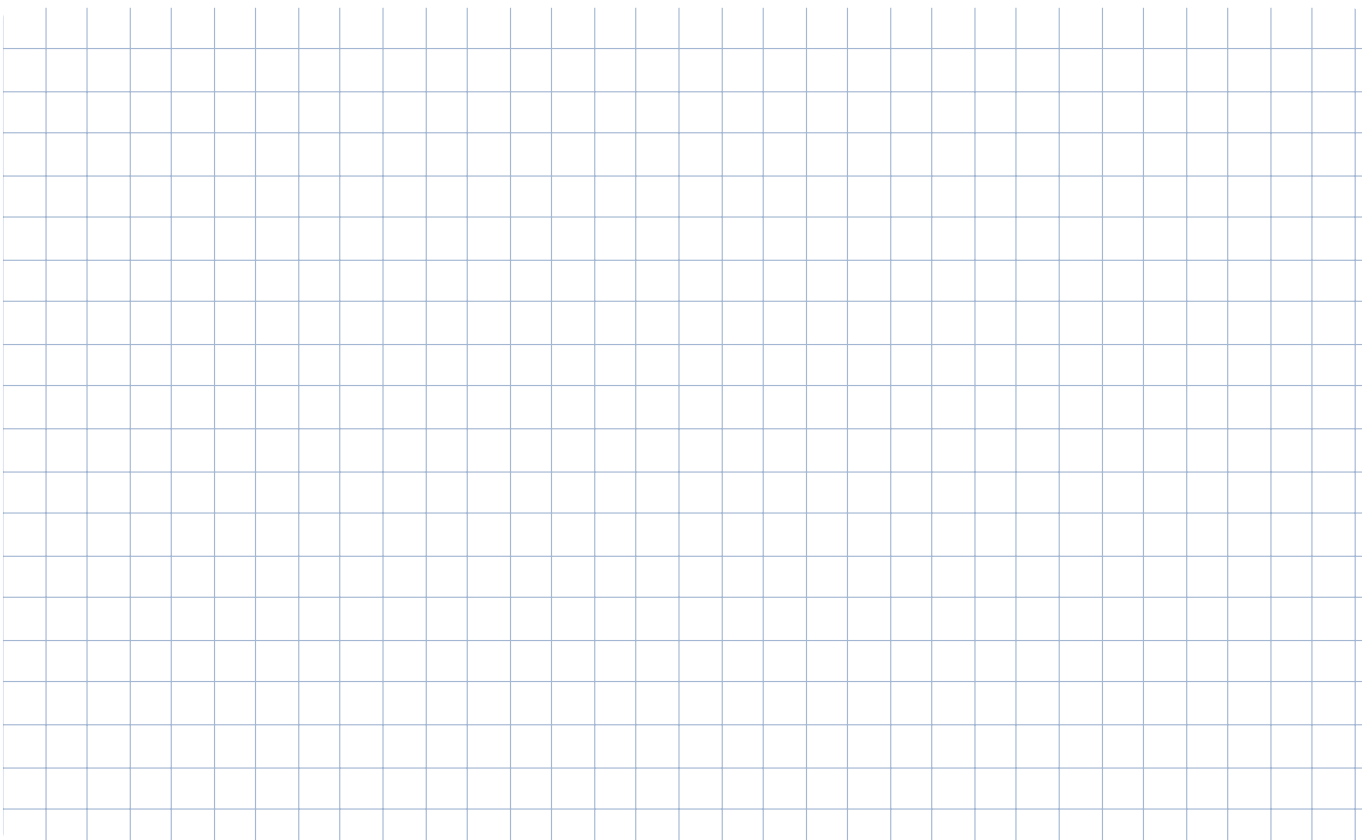
13.) Find the following for the graph $y = 2 - 5 \cos\left(\frac{1}{2}x + \frac{\pi}{2}\right)$

(a) Amplitude:

(b) Phase Shift:

(c) Period:

(d) Graph $y = 2 - 5 \cos\left(\frac{1}{2}x + \frac{\pi}{2}\right)$ (*one period is sufficient*)



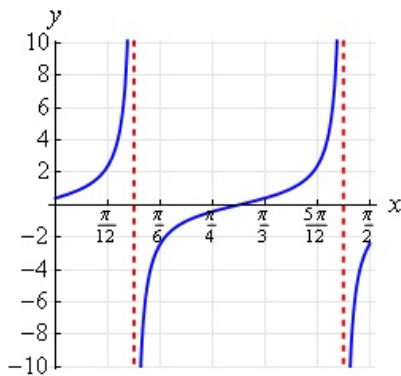
14.) Consider the function $y = \tan\left(3x + \frac{\pi}{2}\right)$

(a) What is the period of the graph?

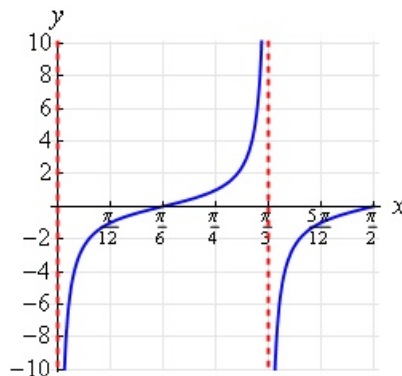
(b) What is the phase shift of the graph?

(c) Where are the vertical asymptotes?

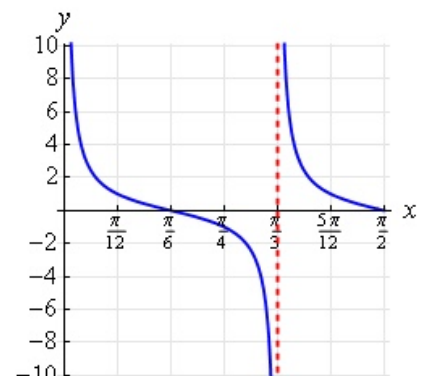
(d) Which of the graphs below represents the given curve?



Graph A



Graph B



Graph C

15.) Is $(\cos^2 x)(\cot^2 x + 1) = \cot^2 x$ an identity?

16.) Verify the identity: $(\sin x + \cos x)^2 = 1 + \sin 2x$

Bonus Verify the identity: $\sin 3x = 3 \sin x - 4 \sin^3 x$.