

Math 335  
Spring 2024  
Exam 2, March 7

No books, notes, scratch paper, phones.  
Please show all your work and clearly mark your answers.  
Problems are 5 points each unless noted.  
If a problem is too hard, move on to an easier one.  
No calculators on problems 1-9.

Page	Pts	Possible
1		15
2		15
3		10
4		10
5		10
6		10
7		20
8		10
Total		100

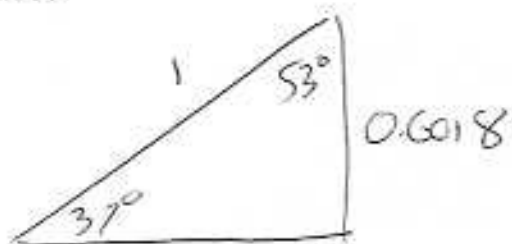
Name (printed): Key

Name (signature): \_\_\_\_\_

Score for the class so far: \_\_\_\_\_ out of \_\_\_\_\_ points

Percent: \_\_\_\_\_ %

1) Suppose that  $\cos(53^\circ) = 0.6018$ . Find a \*different\* trig function of a \*different\* angle that also equals 0.6018.



$$\sin 37^\circ = 0.6018$$

2) Beer is 5% alcohol. Wine is 12% alcohol. How much beer and wine should be mixed to make 10 liters of a beverage that is 7.8% alcohol?

(10 pts)

$$B + W = 10$$

$$0.05B + 0.12W = (0.078)(10) = 0.78$$

$$5B + 12W = 78$$

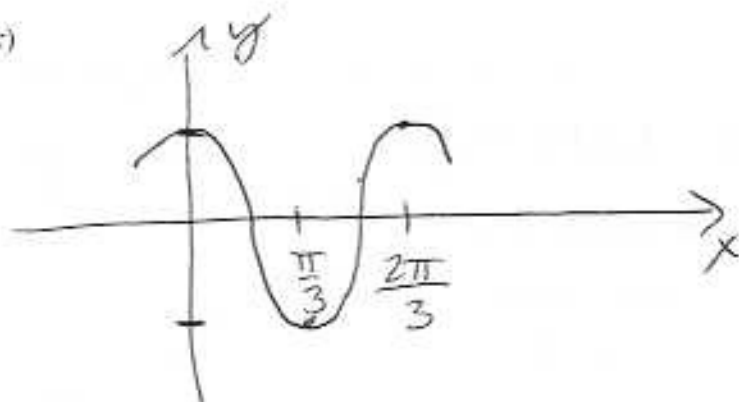
$$5B + 5W = 50$$

$$7W = 28$$

$$W = 4 \text{ liters}$$

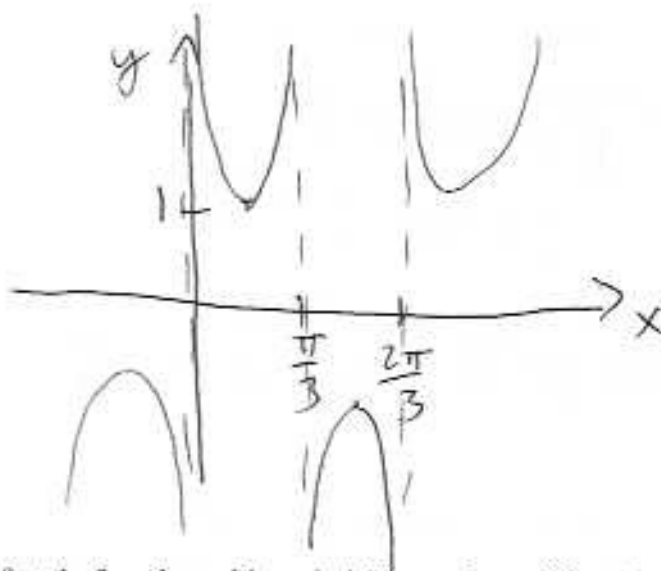
$$B = 6 \text{ liters}$$

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



3b) Graph  $y = \csc(3x)$

(10 pts)



4) Find the equation of a trig function with period 10, maximum 32, and minimum 26.

$$p = \frac{2\pi}{b} = 10$$

$$b = \frac{\pi}{5}$$

$$y = 29 + 3 \cos\left(\frac{\pi}{5}x\right)$$

5a) Show that  $f(x) = 4x - 9$  is a one-to-one function. (Use the definition of one-to-one.)

Assume  $f(a) = f(b)$

$$4a - 9 = 4b - 9$$

$$4a = 4b$$

$$a = b$$

Tada.

b) Show that  $g(x) = 4x^2 - 9$  is not a one-to-one function. (Find a counter-example.)

Answers may vary  
 $x = 3$   $g(3) = 27$

$$x = -3 \quad g(-3) = 27$$

$$g(3) = g(-3) \quad \text{but } 3 \neq -3$$

6a) As  $x$  approaches  $\frac{\pi}{4}$  from the left, what happens to  $\tan(x)$ ?

$$\tan\left(\frac{\pi}{4}\right) = 1 \quad \text{so } \tan x \rightarrow 1$$

b) As  $x$  approaches  $\frac{\pi}{2}$  from the left, what happens to  $\tan(x)$ ?

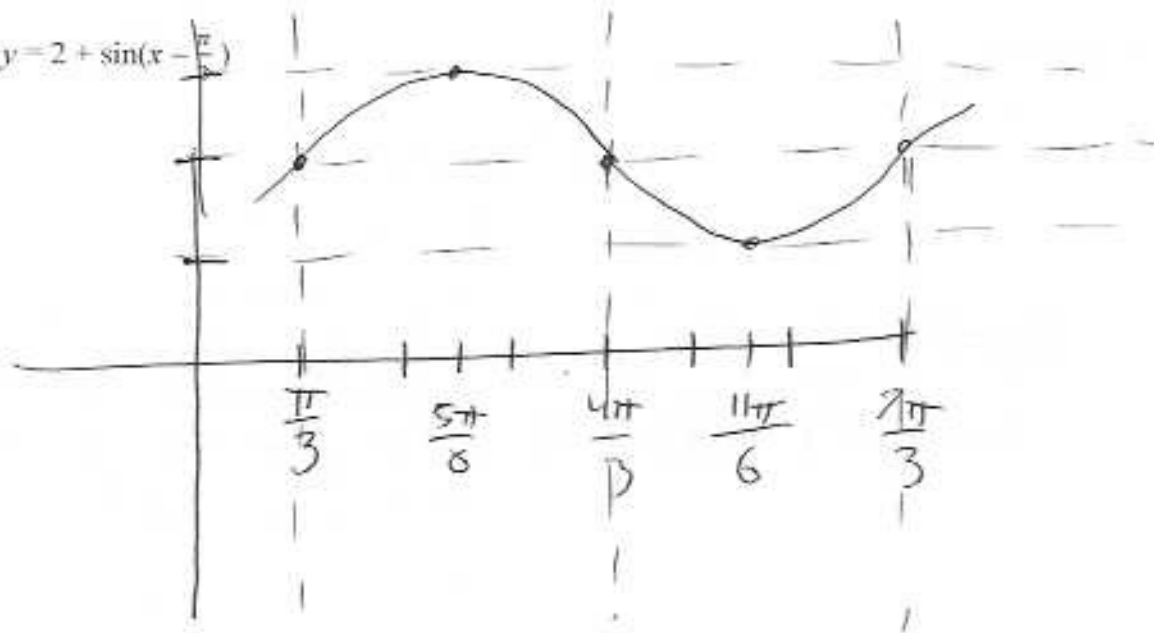
$\tan x \rightarrow \infty$  at this vertical asymptote

c) As  $x$  approaches infinity, what happens to  $\tan^{-1}(x)$ ?

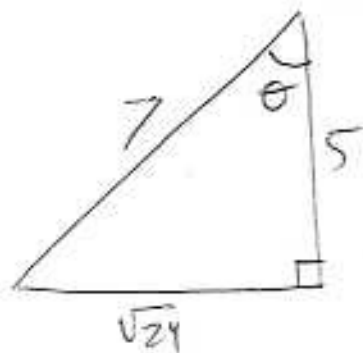
$\tan^{-1}(x)$  approaches  $\frac{\pi}{2}$  at this

horizontal asymptote

7) Graph  $y = 2 + \sin(x - \frac{\pi}{3})$



8) Find  $\tan(\cos^{-1}(\frac{5}{7}))$



$$\cos \theta = \frac{5}{7}$$

$$\cos^{-1}\left(\frac{5}{7}\right) = \theta$$

$$\tan(\theta) = \frac{\sqrt{24}}{5}$$

One more on the back

9) Simplify:

(10 pts)

$$\frac{x^2+x-6}{x+5} \cdot \frac{2x}{x^2-9}$$

$$\frac{(\cancel{x+5})(x-2) \cdot 2x}{(x+5)(\cancel{x+3})(x-3)} = \boxed{\frac{2x(x-2)}{(x+5)(x-3)}}$$

Name:

Key

10) A child on a swing has a horizontal position approximately given by:

$$P(t) = 1.3 \sin(2.2t), \text{ where } P \text{ is given in meters, and } t \text{ is given in seconds.}$$

a) Find the period of oscillation of the swing.

b) Find the frequency.

c) Find the maximum horizontal distance from the back position of the swing to the front position of the swing.

d) Extra: what is the average horizontal speed of the swing as it moves from back position to the front position?

(10 pts)

$$4 \text{ a) } \frac{2\pi}{2.2} = \boxed{2.86 \text{ seconds}}$$

$$2 \text{ b) } \boxed{0.350 \text{ cycles per second}}$$

$$4 \text{ c) } \boxed{2.6 \text{ meters}}$$

$$3 \text{ d) } \frac{2.6 \text{ meters}}{1.43 \text{ s}} = \boxed{1.82 \text{ m/s}}$$

11)a) Find  $\cot(-82^\circ)$

$-0.141$

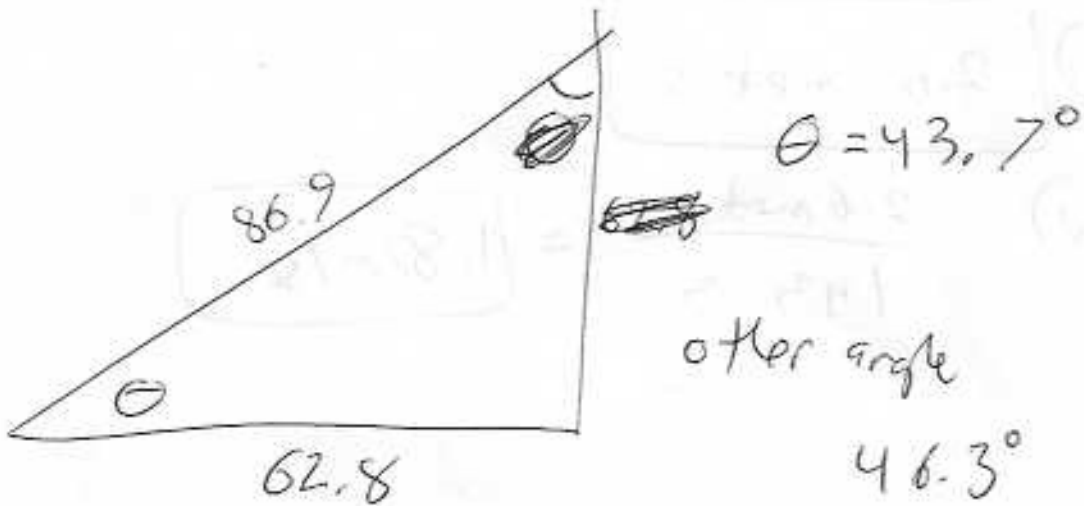
b) Find  $\sin\left(\frac{5\pi}{13}\right)$

$0.935$

(10 pts)

12) The hypotenuse of a right triangle is 86.9 inches, and one leg is 62.8 inches. Find the angle between these two sides. Find the other angle. Find the other side.

(10 pts)



other side 60.1 in



13) Find a value of  $x$  which maximizes that function:

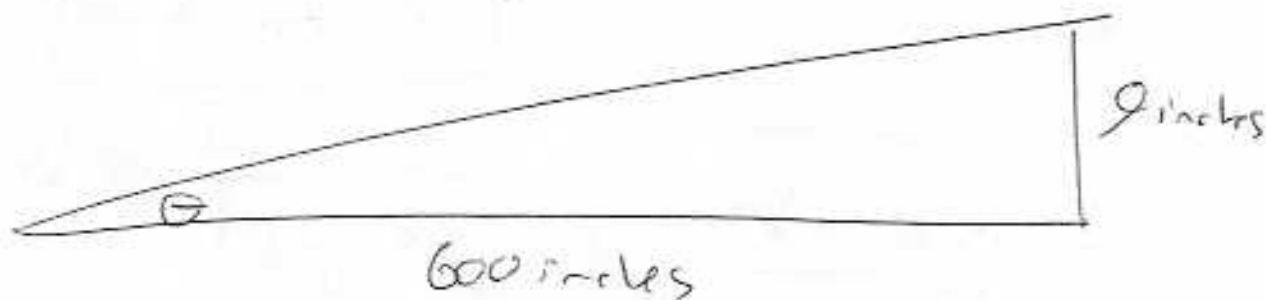
$$f(x) = 2 + 0.6\cos(3.4x - 4.112)$$

$\cos 0$  is max

$$3.4x - 4.112 = 0$$

$$x = 1.209$$

14) A basketball is 9 inches in diameter. You are 50 feet away from the ball. What angle does it make as seen from your eye?



$$\theta = \tan^{-1}\left(\frac{9}{600}\right) \approx 0.859^\circ$$

Bye

This could block the sun or moon.