

Math 335  
Spring 2024  
Exam 1, February 13

No books, notes, scratch paper, phones.  
Please show all your work and clearly mark your answers.  
Problems are 6 points each unless noted.  
If a problem is too hard, move on to an easier one.  
No calculators on problems 1-11.

Page	Pts	Possible
1		16
2		12
3		18
4		16
5		10
6		6
7		16
8		6
Total		100

Name (printed):

*Key*

Name (signature):

Score for the  
class so far:

\_\_\_\_\_ out of \_\_\_\_\_ points

Percent:

\_\_\_\_\_ %

Approx letter grade:

3 1) a) What is the domain of sine? All real numbers

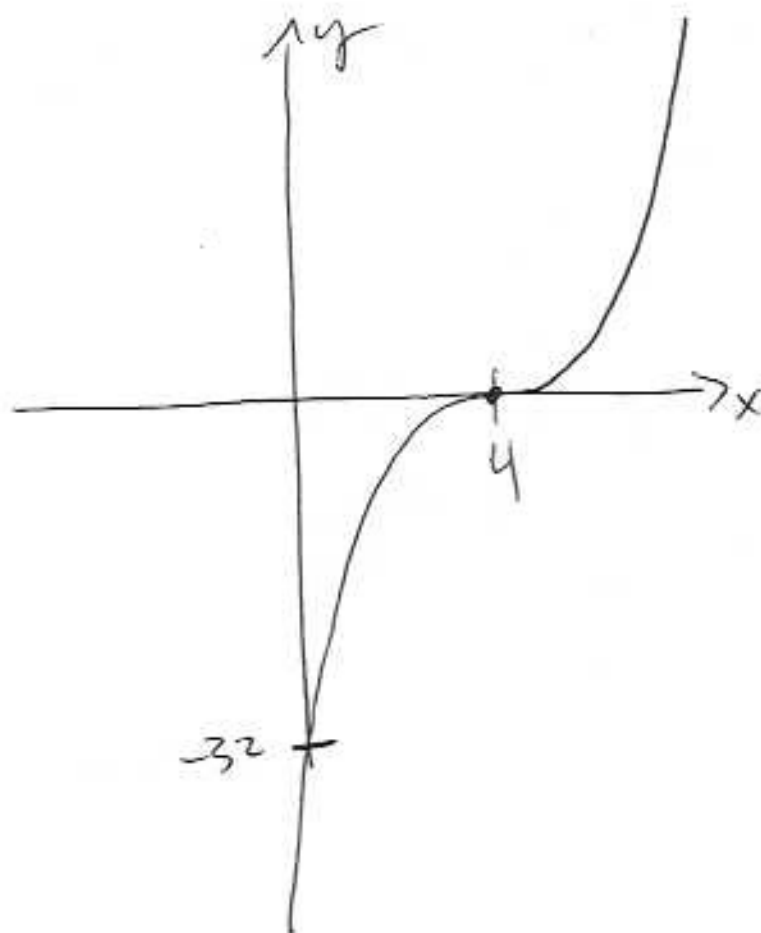
4 b) What is the domain of tangent? All  $\theta \neq \pm 90^\circ, \pm 270^\circ, \pm 450^\circ, \dots$

3 c) What is the domain of cotangent?

(10 points)

All  $\theta \neq 0^\circ, \pm 180^\circ, \pm 360^\circ, \dots$

2) Graph:  $y = \frac{(x-4)^3}{2}$



3) Suppose  $f(x) = x^2 + \frac{5}{x}$

a) Find  $f(3)$

$$9 + \frac{5}{3} = 10\frac{2}{3} \text{ or } \frac{32}{3}$$

b) Find  $f(x+2)$

$$(x+2)^2 + \frac{5}{x+2} \text{ or } x^2 + 4x + 4 + \frac{5}{x+2}$$

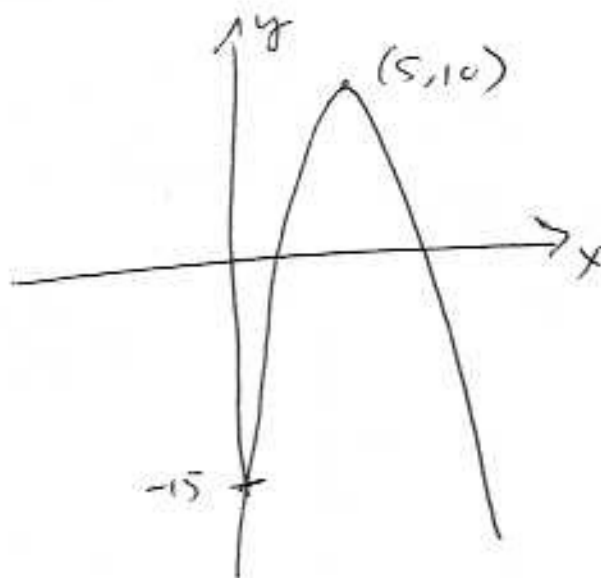
4a) Graph the parabola:

$$y = f(x) = -x^2 + 10x - 15 \text{ y-int}$$

vertex

$$x = -\frac{10}{-2} = 5$$

$$y = -25 + 50 - 15 = 10$$



4b) Find the vertex of this parabola.

$$(5, 10)$$

4c) What is the range of this function?

$$(-\infty, 10]$$

5a) The short leg of a 45-45-90 triangle is 32 inches. Find the hypotenuse.

$$32\sqrt{2} \text{ inches}$$

b) The long leg of a 30-60-90 triangle is 12 cm. Find the hypotenuse.

short:  $\frac{12}{\sqrt{3}}$   $\frac{\sqrt{3}}{\sqrt{3}}$   $\frac{12\sqrt{3}}{3}$   $4\sqrt{3}$

$8\sqrt{3} \text{ cm}$



6a) Find two angles coterminal to  $37^\circ$ .

$$\begin{array}{r} 360 \\ + 37 \\ \hline 397 \\ + 360 \\ \hline 757 \end{array}$$

$$397^\circ, 757^\circ$$

negatives maybe like  $-323^\circ$

b) Find the reference angle for  $255^\circ$ .



$$75^\circ$$

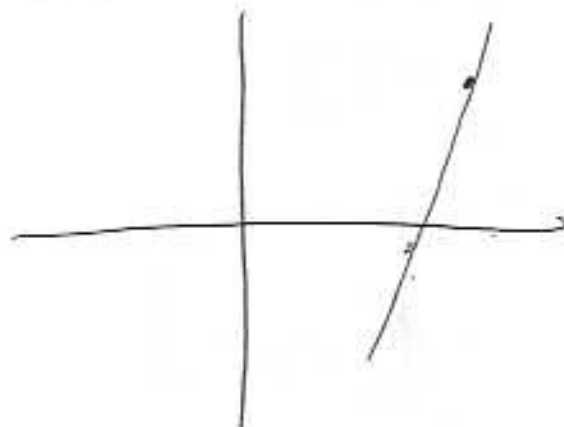
7) Find the equation of the line between  $(8, 6)$  and  $(5, -1)$ .

$$m = \frac{7}{3}$$

$$y - 6 = \frac{7}{3}(x - 8)$$

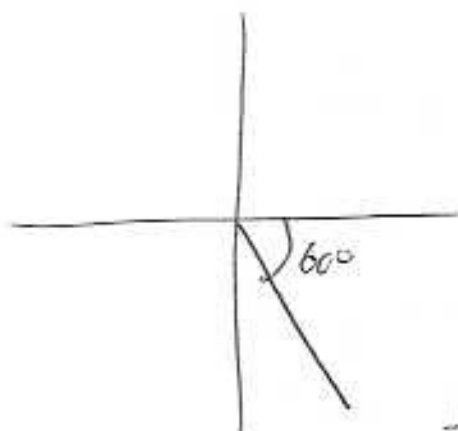
$$y = \frac{7}{3}x - \frac{56}{3} + \frac{18}{3}$$

$$y = \frac{7}{3}x - \frac{38}{3}$$



8a) Find all the trig functions of this angle:  $\frac{5\pi}{3}$

(10 points)



$$\sin \frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$$

$$\csc \frac{5\pi}{3} = -\frac{2}{\sqrt{3}}$$

$$\cos \frac{5\pi}{3} = \frac{1}{2}$$

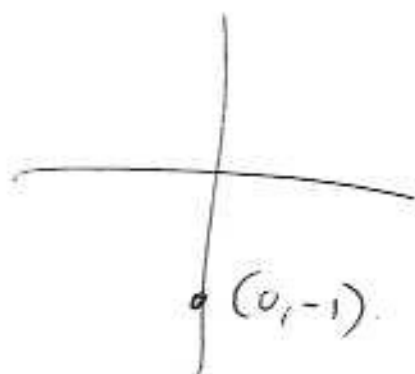
$$\sec \frac{5\pi}{3} = 2$$

$$\tan \frac{5\pi}{3} = -\sqrt{3}$$

$$\cot \frac{5\pi}{3} = -\frac{1}{\sqrt{3}}$$

8b) Find all the trig functions of this angle:  $-90^\circ$

Draw pictures as needed, and possibly for partial credit.



$$\sin(-90^\circ) = -1$$

$$\csc(-90^\circ) = -1$$

$$\cos(-90^\circ) = 0$$

$$\sec(-90^\circ) \text{ is undefined}$$

$$\tan(-90^\circ) \text{ is undefined} \quad \cot(-90^\circ) = 0$$

9) Simplify:

a)  $50 \div 0$       undefined

b)  $0 \div (-10)$       0

c)  $5(0)$       0

d)  $\frac{0}{12}$       0

e)  $\frac{-3}{0}$       undefined

f)  $(0)\left(\frac{9}{0}\right)$       undefined

10) Solve this system and check your answer:

(10 points)

$$\begin{aligned}x + y + z &= 5 \\2x + 5y + 3z &= 12 \\-3x + 2y - z &= -13\end{aligned}$$

$$\begin{aligned}3x + 3y + 3z &= 15 \\2x + 5y + 3z &= 12\end{aligned} \quad \downarrow$$

$$-2x + 3y = -8$$

$$2x - 4y = 6$$

$$x - 2y = 3$$

$$x - y = 3$$

$$-y = -2$$

$$\begin{aligned}y &= 2 \\x &= 7 \\z &= -4\end{aligned}$$

$$7 + 2 + (-4) = 5$$

$$14 + 10 - 12 = 12$$

$$-21 + 4 + 4 = -13 \quad \checkmark$$

11) Draw a function that has all of these properties.

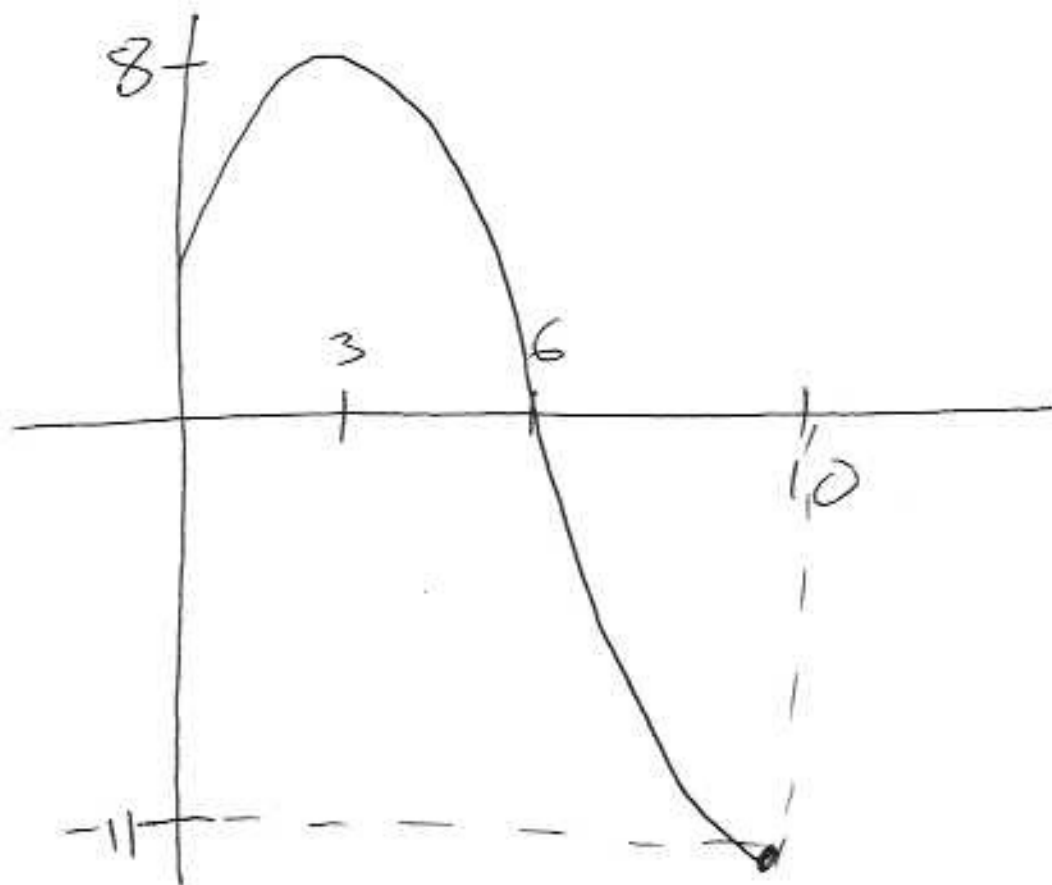
\* The domain is  $[0, 10]$ .

\* It is positive and increasing on  $(0, 3)$ .

\* It is positive and decreasing on  $(3, 6)$ .

\* It is negative and decreasing on  $(6, 10)$ .

\* The range is  $[-11, 8]$ .

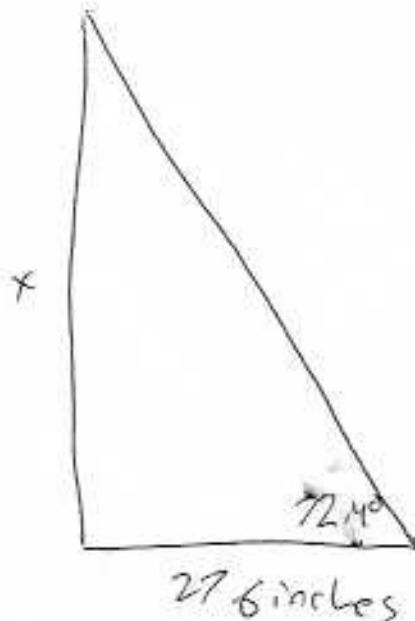


Name:

Key

12) The shortest side of a right triangle is 27.6 inches. One angle is  $72.4^\circ$ . Find the long leg of the triangle.

(10 points)



$$\tan 72.4^\circ = \frac{x}{27.6 \text{ inches}}$$

$$x = 87.0 \text{ inches}$$

13) A car tire is 27 inches in diameter and spins 298 times per minute. What is the car's speed in miles per hour? Note: There are 12 inches in a foot and 5280 feet in a mile and 60 seconds in a minute and 60 minutes in an hour.

$$v = r\omega = (13.5 \text{ inches}) (298 \cdot 2\pi \text{ rad/min})$$

$$= 25277 \text{ in/min}$$

$$= 23.9 \text{ mph}$$

One more on the back



14)a) Find  $\sec(78^\circ)$ . Write to 4 significant figures.

4.810

or 4.8097

b) Find  $\tan(\frac{\pi}{10})$ . Write to 4 significant figures.

0.3249



$\tan(78^\circ) = x$

$(\tan(78^\circ))^{-1} = \sec(78^\circ) = 4.810$

$\tan(\frac{\pi}{10}) = 0.3249$