

AB Calculus Summer Assignment

Name: \_\_\_\_\_

**Begin by enrolling in the AB Calculus Course for the 2017-18 school year in Google classroom. The class code is 5mfhavx**

Dear Future AB Calculus Student,

If you are receiving this assignment, then you have signed up for AB Calculus. We have lots of material to cover next year to get you ready for the AP Calculus test next May. This assignment includes material that is important for the success of every calculus student and we want you to be well prepared.

**The assignment is due the first day of class! --- for a grade!**

Please feel free to use your calculator, a textbook or the internet to help you answer all questions. We will be having quizzes on these functions during the first days of class. Knowing the shape and characteristics of these functions will help you this year when we do limits, derivatives and integrals.

I hope you have a great summer and I look forward to working with everyone when we return in August.

Sincerely,

Mark Landry

**Calculus AB Homework: Graphs of Functions**

Name: \_\_\_\_\_

For each of the 18 functions below, provide the following information by graphing the function on your calculator and observing the graph or by consulting a reference book or the internet.

- Sketch the graph
- State the domain and range
- State coordinates of any x- or y-intercepts
- Give the equation of any vertical or horizontal asymptotes
- Describe the behavior of the function values by completing these four statements:

**As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_** (as x moves to positive infinity, f(x) moves to ?)

**As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_** (as x moves to negative infinity, f(x) moves to ?)

**As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_** (as x moves to zero from the positive side...)

**As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_** (as x moves to zero from the negative side...)

- Is the function:
  - Odd: the graph is symmetric to the origin and  **$f(-x) = -f(x)$**
  - even: the graph is symmetric to the y-axis and  **$f(-x) = f(x)$**
  - periodic: state the period
  - none of these

Here are the functions to use:

- $f(x) = x$**
- $f(x) = x^2$**
- $f(x) = \sqrt{x}$**
- $f(x) = x^3$**
- $f(x) = \sqrt[3]{x}$**
- $f(x) = |x|$**
- $f(x) = e^x$**
- $f(x) = \ln x$**
- $f(x) = \frac{|x|}{x}$**
- $f(x) = \sin x$**
- $f(x) = \cos x$**
- $f(x) = \tan x$**
- $f(x) = \csc x$**
- $f(x) = \sec x$**
- $f(x) = \cot x$**
- $f(x) = \frac{1}{x}$**
- $f(x) = \frac{1}{x^2}$**
- $f(x) = \sqrt{9 - x^2}$**

## Calculus AB Homework: Graphs of Functions

Name: \_\_\_\_\_

### 1. Function: $f(x) = x$

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

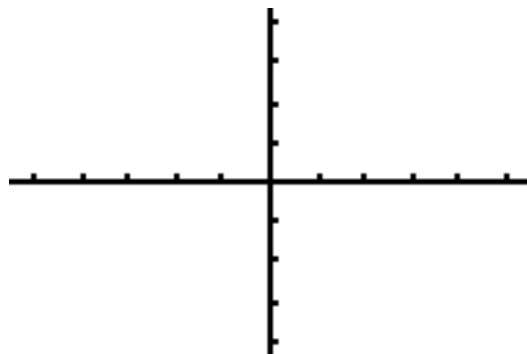
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



### 2. Function: $f(x) = x^2$

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

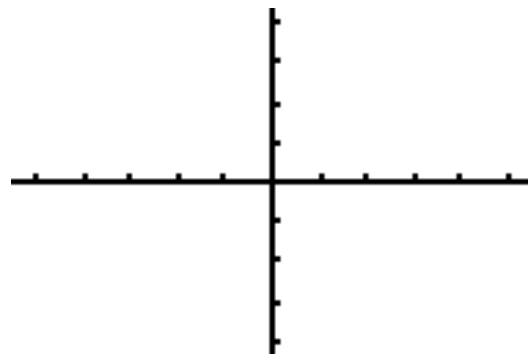
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



### 3. Function: $f(x) = \sqrt{x}$

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

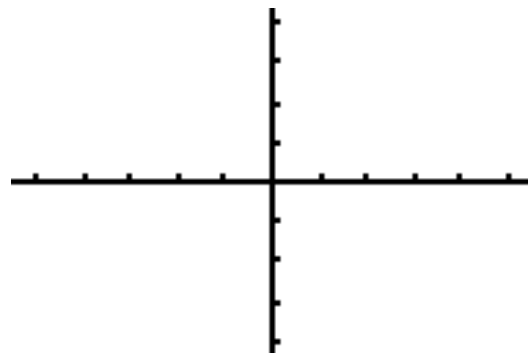
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**4. Function:  $f(x) = x^3$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

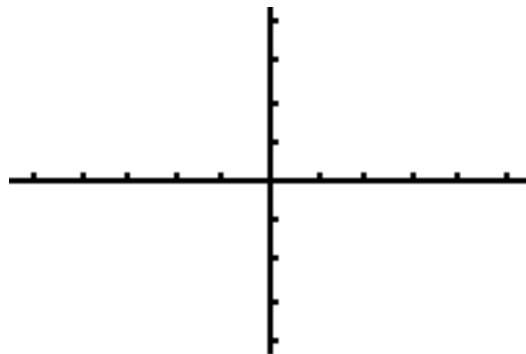
Coordinates of x-intercept(s): \_\_\_\_\_

Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

**5. Function:  $f(x) = \sqrt[3]{x}$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

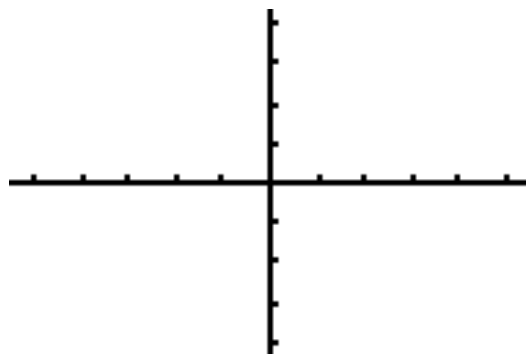
Coordinates of x-intercept(s): \_\_\_\_\_

Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

**6. Function:  $f(x) = |x|$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

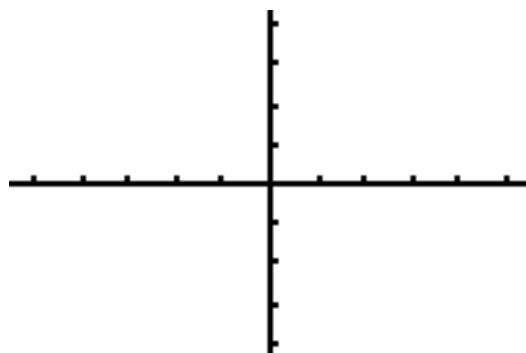
Coordinates of x-intercept(s): \_\_\_\_\_

Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**7. Function:  $f(x) = e^x$**

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

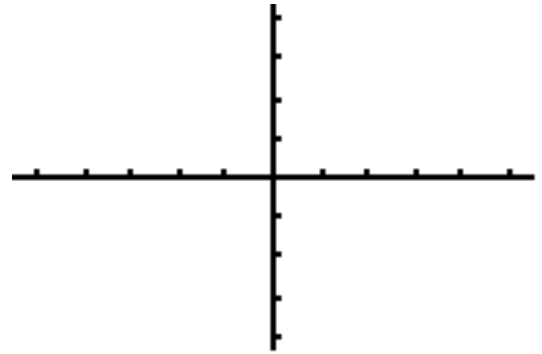
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**8. Function:  $f(x) = \ln x$**

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

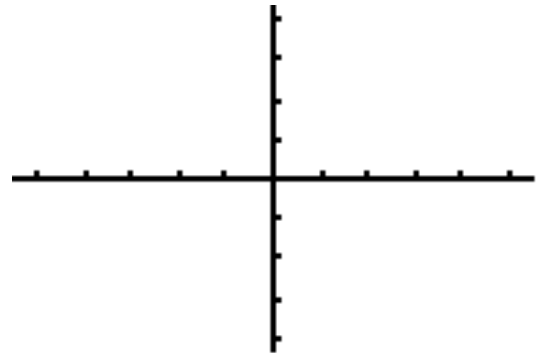
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**9. Function:  $f(x) = \frac{|x|}{x}$**

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

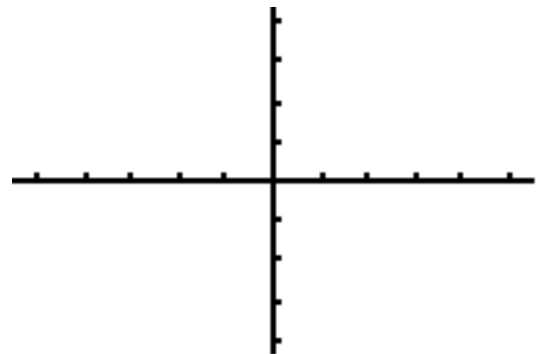
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**10. Function:**  $f(x) = \frac{1}{x}$

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

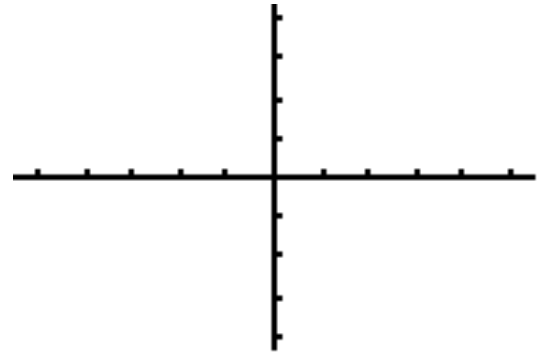
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**11. Function:**  $f(x) = \frac{1}{x^2}$

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

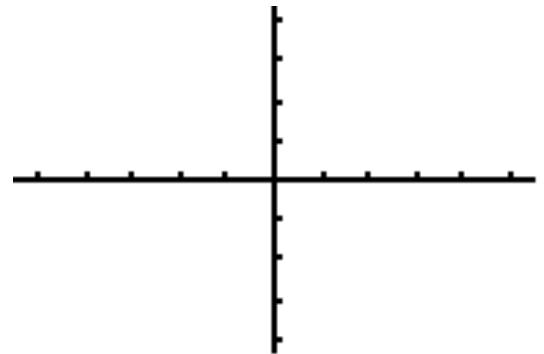
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**12. Function:**  $f(x) = \sqrt{9 - x^2}$

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

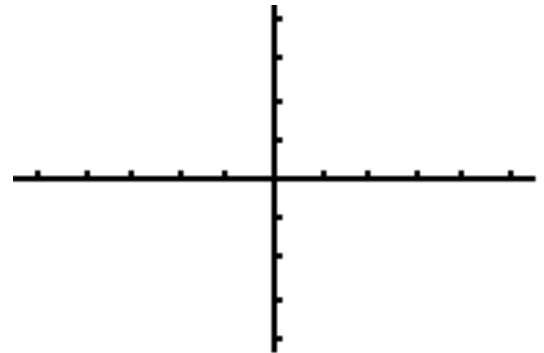
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.



**13. Function:  $f(x) = \sin x$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

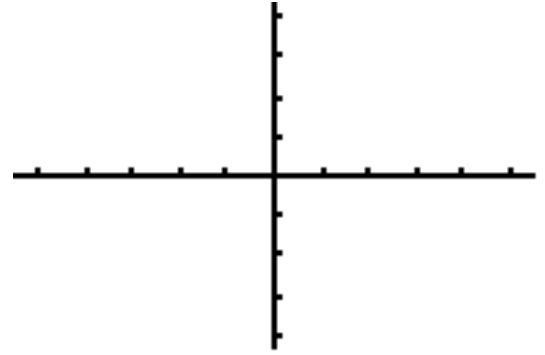
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

What is the period? \_\_\_\_\_

**14. Function:  $f(x) = \cos x$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

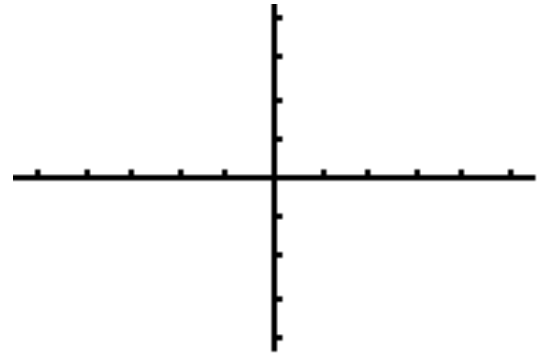
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

What is the period? \_\_\_\_\_

**15. Function:  $f(x) = \tan x$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

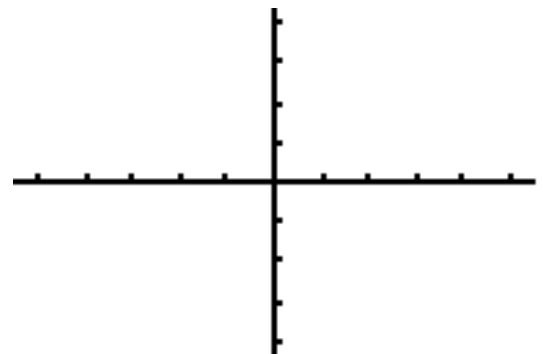
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

What is the period? \_\_\_\_\_



**16. Function:  $f(x) = \csc x$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

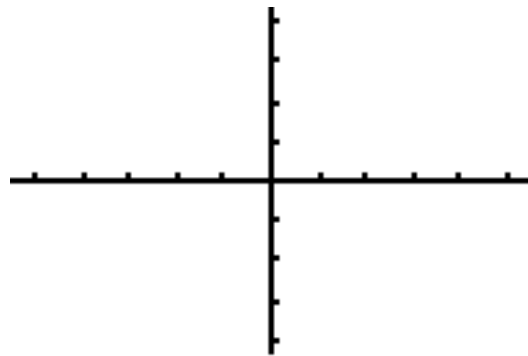
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

What is the period? \_\_\_\_\_

**17. Function:  $f(x) = \sec x$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

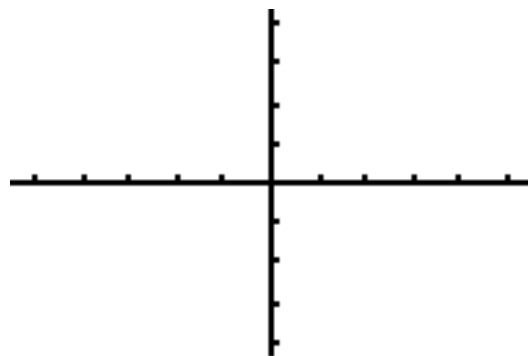
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

What is the period? \_\_\_\_\_

**18. Function:  $f(x) = \cot x$** 

Domain: \_\_\_\_\_ Range: \_\_\_\_\_

Coordinates of x-intercept(s): \_\_\_\_\_

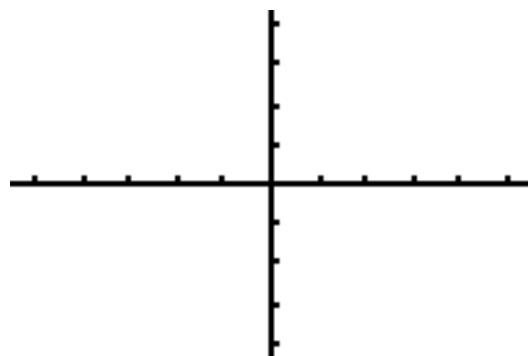
Coordinates of y-intercept: \_\_\_\_\_

Equation of V. A.: \_\_\_\_\_ Equation of H. A.: \_\_\_\_\_

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow$  \_\_\_\_\_?As  $x \rightarrow 0^+$ ,  $f(x) \rightarrow$  \_\_\_\_\_? As  $x \rightarrow 0^-$ ,  $f(x) \rightarrow$  \_\_\_\_\_?

Is the function even, odd or neither? Circle one.

What is the period? \_\_\_\_\_





**Trigonometry Review**

1. Write the 3 Pythagorean identities for trigonometry.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

2. Write the double angle formula for sine:  $\sin 2\theta =$  \_\_\_\_\_

3. Write the 3 versions of the double angle formula for cosine:

a.  $\cos 2\theta =$  \_\_\_\_\_

b.  $\cos 2\theta =$  \_\_\_\_\_

c.  $\cos 2\theta =$  \_\_\_\_\_

4. Write the power reducing formulas for sine and cosine:

a.  $\sin^2 \theta =$  \_\_\_\_\_

b.  $\cos^2 \theta =$  \_\_\_\_\_

5. Write the formula for the area of a sector **A** of a circle in terms of the radius **r** and the central angle  **$\theta$** :

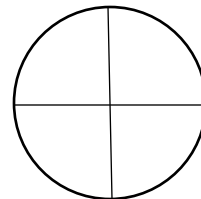
Area of a sector of a circle: \_\_\_\_\_

6. Define the radian measure of an angle  **$\theta$**  in terms of the arc length **s** and the radius **r**.

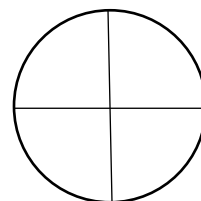
Radian measure of an angle: \_\_\_\_\_

7. Solve each trigonometric equation for all solutions on the interval  $[0, 2\pi)$ . Give exact answers in radians. Show your solutions on the circle.

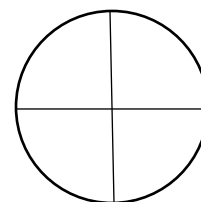
a.  $\sin x = \frac{1}{2}$



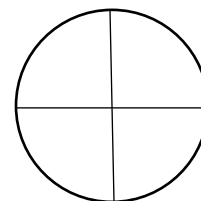
b.  $\sqrt{3} \csc x = 2$



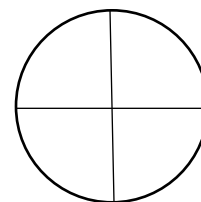
c.  $2 \cos x = -1$



d.  $3\sqrt{3} \sec x = -6$



e.  $\tan \theta = 1$



f.  $\cot x = -\sqrt{3}$

