

## Honors Pre-Calculus Summer work 2023

Due: Friday September 1, 2023

Complete the following problems over the summer and have them ready by September 1<sup>st</sup> . Answer each and show the work. Work should be easy to read and answers should be easy to locate.

No Calculator.

**Linear Equations**

Write the following equation in point slope form  $(y - y_1) = m(x - x_1)$

1. The line containing the point  $(4, -7)$  and having slope of  $\frac{5}{2}$ .
  
  
  
  
  
  
  
  
  
  
2. The line containing the point  $(-13, 5)$  and parallel to  $4x + 2y = -7$ .
  
  
  
  
  
  
  
  
  
  
3. The line containing the point  $(0, -2)$  and perpendicular to  $x - 4y = 3$ .
  
  
  
  
  
  
  
  
  
  
4. The line containing the point  $(2, 9)$  and having slope of 0.
  
  
  
  
  
  
  
  
  
  
5. The perpendicular bisector of the segment between  $(-5, 3)$  and  $(12, 3)$ .

**Composition of Functions.**

Given  $f(x) = 4x - 1$  and  $g(x) = x + 6$ , find the following compositions.

6.  $g(f(x))$

7.  $f(g(x))$

8.  $f(f(x))$

9.  $g(f(g(x)))$

**Basic Factoring.**

Factor each of the following as completely as possible.

10.  $9x^3y - 25xy^3$

11.  $x^3 + 7x^2 - 18x$

12.  $8y^3 + 24y^2 - 7y - 21$

**Function Analysis.**

Determine the domain and zeros of each of the following functions.

13.  $p(x) = (x + 5)(x - 8)$

14.  $c(x) = \frac{-6}{2x - 3}$

15.  $f(x) = \frac{x + 1}{x + 2}$

16.  $p(x) = \frac{6x^2 - 7x - 3}{2}$

17.  $q(x) = \frac{x - 5}{(x + 2)(x - 5)}$

18.  $t(x) = \frac{(x - 3)(x + 2)^2}{(x - 10)^3}$

### Mixed Review Problems

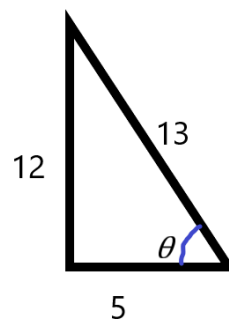
19. Find all roots of  $p(x) = 3x^3 + x^2 + 12x + 4$

20. Determine the inverse ( $f^{-1}$ ) for  $f(x) = \sqrt[3]{x-3}$

21. Solve  $\sqrt{4y-9} - \sqrt{5y-4} = 1$

22. Simplify  $\frac{y - \frac{1}{y}}{y + \frac{1}{y}}$

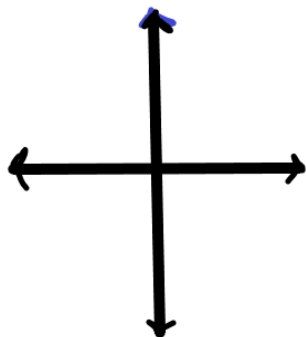
23. Find  $\sin \theta$ ,  $\cos \theta$  and  $\tan \theta$  for the triangle.



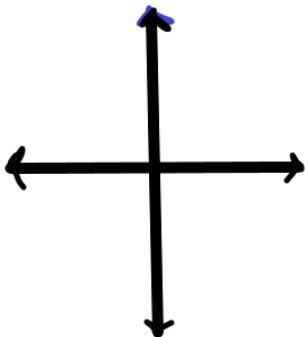
## Graphs

Graph each function and clearly indicate the units on the axes provided.

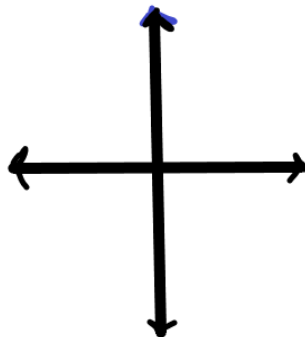
24.  $f(x) = x$



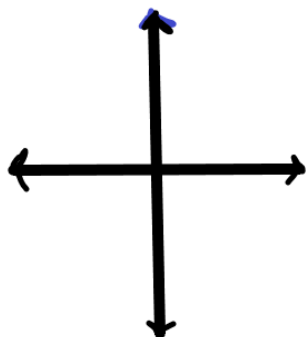
25.  $f(x) = x^2$



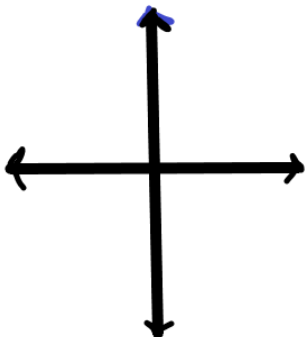
26.  $f(x) = x^3$



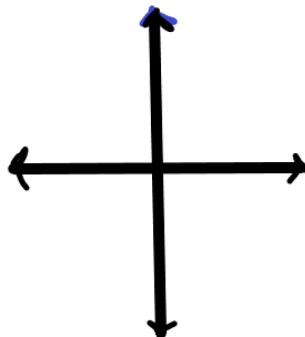
27.  $f(x) = |x|$



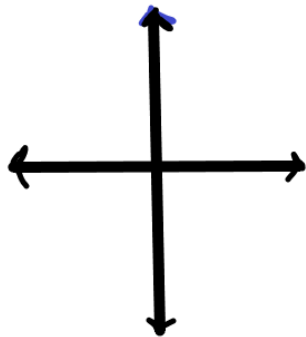
28.  $f(x) = \frac{1}{x}$



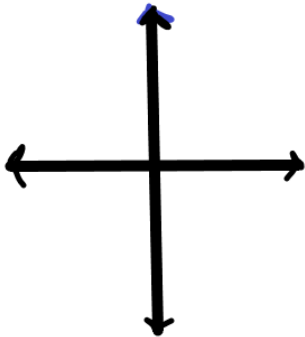
29.  $f(x) = \frac{1}{x^2}$



30.  $f(x) = \sqrt{x}$



31.  $f(x) = \sqrt[3]{x}$



32.  $x = -3$

