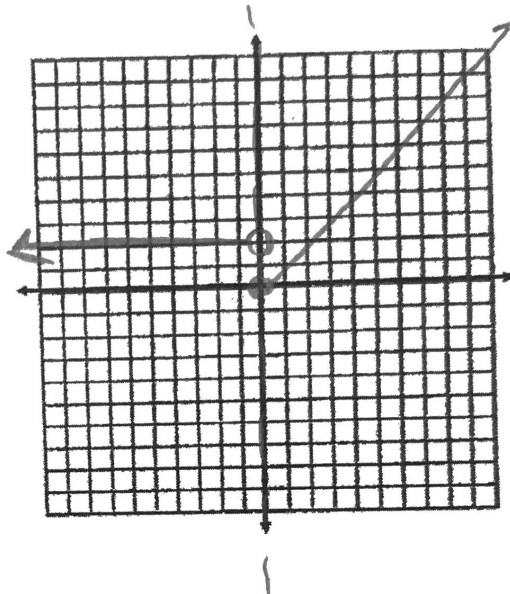


1. Identify the parent function that can be used to graph the function  $f(x) = -\frac{8}{x-2}$ . Do not graph the function.

$$y = \frac{1}{x}$$

2. Graph:

$$f(x) = \begin{cases} 2 & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$$



3. Write a polynomial function with integral coefficients to model the set of data below.

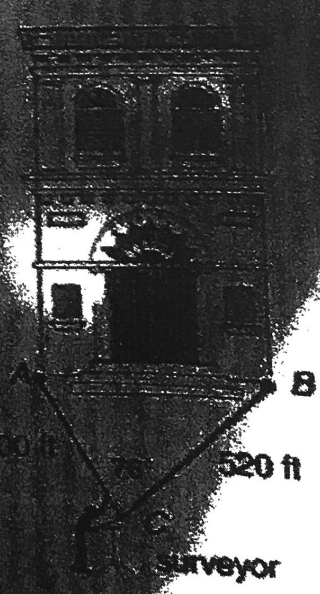
x	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9
F(x)	7.3	11.2	12.1	11.2	8	6.2	3.5	2.5	2.2	5.7	12.5

- create scatterplot to get general shape  
 - looks cubic  
 → cubicreg  
 $y = 1.018x^3 - 19.24x^2 + 115.74x - 212.8$

4. A surveyor wishes to measure the width of a building. The distances from A and B to the surveyor at C are 400 and 520 ft, respectively. The measure of the angle at C is  $76^\circ$ . Determine the width of the building.

$$c^2 = 400^2 + 520^2 - 2(400)(520)\cos 76$$

$$c = 574.25 \text{ ft}$$



## 9. Population of Endangered Species

Often environmentalists will capture an endangered species and transport the species to a controlled environment where the species can produce offspring and regenerate its population. Suppose that six American bald eagles are captured, transported to Montana, and set free. Based on experience, the environmentalists expect the population to grow according to the model

$$P(t) = \frac{500 \leftarrow K = \text{carrying capacity}}{1 + 83.33e^{-0.162t}}, \text{ where } t \text{ is measured in years.}$$

- (a) Determine the carrying capacity of the environment. What is the growth rate of the bald eagle?

$$K = 500. \quad r = 16.2\%$$

- (b) Approximately when will the population be 300 eagles?

$$300 = \frac{500}{1 + 83.33e^{-0.162t}}$$

$$1 + 83.33e^{-0.162t} = \frac{500}{300}$$

$$\frac{83.33e^{-0.162t}}{83.33} = \frac{0.6667}{83.33}$$

$$e^{-0.162t} = 0.008$$

$$\frac{\ln 0.008}{-0.162} = \frac{-0.162t}{-0.162}$$

$$t = 29.8 \text{ yrs}$$

10. A pizza baked at 450°F is removed from the oven at 5:00 pm into a room that is a constant 70°F. After 5 minutes, the pizza is at 300°F. At what time can you begin eating the pizza if you want its temperature to be 135°F?

$$(0, 450)$$

$$(5, 300)$$

exp reg:  $y = 450(0.9221)^t$

$$\frac{135}{450} = \frac{450(0.9221)^t}{450}$$

$$0.3 = 0.9221^t$$

$$\log_{0.9221} 0.3 = t$$

$$14.84 = t$$

$$5:15 \text{ pm}$$

11. Find each of the following limits using the graph below.

a) Find the  $\lim_{x \rightarrow -6^-} f(x)$

$\infty$

b) Find the  $\lim_{x \rightarrow -4^+} f(x)$

$-2$

c) Find the  $\lim_{x \rightarrow -4} f(x)$

DNE

d) Find the  $\lim_{x \rightarrow 4} f(x)$

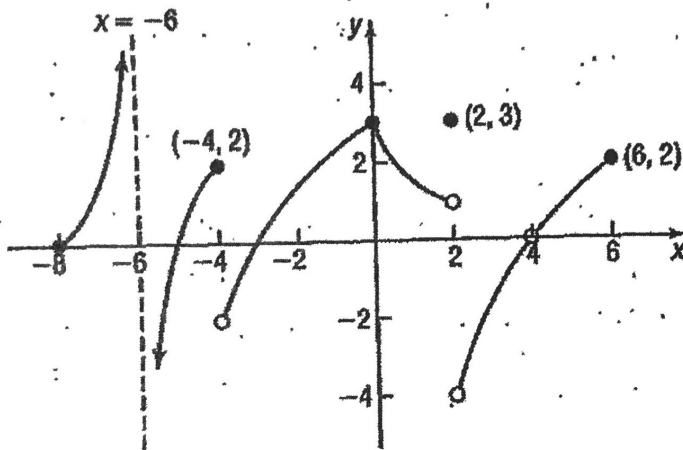
0

e) Find  $f(-4)$

2

f) Find  $f(4)$

DNE



12. Describe the shape of the polar graph that would result with the following polar equations.

a)  $y = 2\sin 5\theta$  rose w/ 5 petals

b)  $y = 2\cos 2.5\theta$  a incomplete rose

13. For each of the following equations, identify the conic with focus at the origin, the directrix, and the eccentricity.

a)  $r = \frac{3}{2+4\cos\theta}$

hyperbola  
(horizontal)

b)  $r = \frac{2}{5+7\cos\theta}$

hyperbola  
(horizontal)

c)  $r = \frac{3}{1+\sin\theta}$

parabola

d)  $r = \frac{6}{3+2\sin\theta}$

circle

e)  $r = \frac{12}{4+5\cos\theta}$

hyperbola  
(horizontal)

f)  $r = \frac{7}{2-2\sin\theta}$

parabola

g)  $r(2-\cos\theta)=1$

$r = \frac{1}{2-\cos\theta}$   
ellipse

h)  $r(1+\sin\theta)=1$

$r = \frac{1}{1+\sin\theta}$   
parabola

5. Solve for x.  $\ln(x) = 9$   
 $e^9 = x$

6. Verify that  $\cot(x)\sin(x) = \cos(x)$

$$\frac{\cos x}{\sin x} \cdot \sin x = \cos x$$

$$\cos x = \cos x$$

7. Find each limit, or state that the limit does not exist and explain your reasoning.

a)  $\lim_{n \rightarrow \infty} \frac{3n}{4n+1} = \frac{3}{4}$

b)  $\lim_{n \rightarrow \infty} \frac{4n^3 - 3n}{n^4 - 4n^3} = 0$

c)  $\lim_{x \rightarrow 4} \frac{x^2 + 5}{x - 2x} = \frac{4^2 + 5}{4 - 2(4)} = \frac{21}{-4}$

d)  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2} = \frac{(x-2)(x+2)}{(x-2)} = x+2 = 2+2 = 4$

e)  $\lim_{n \rightarrow \infty} \frac{2^n n^3}{3n^3} = \infty$

\*  $n \rightarrow \infty$  = end behavior = horizontal asymptote (BOSTON)

8. Find the sum of the infinite series  $120 - 240 + 480 - 960 + \dots$  or state that the sum does not exist and explain your reasoning.

sum does not exist

b/c  $|r| > 1$ .