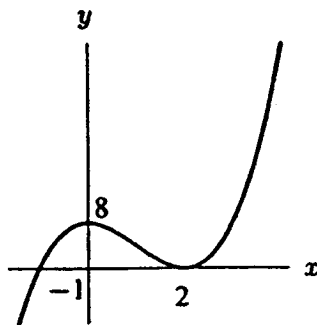


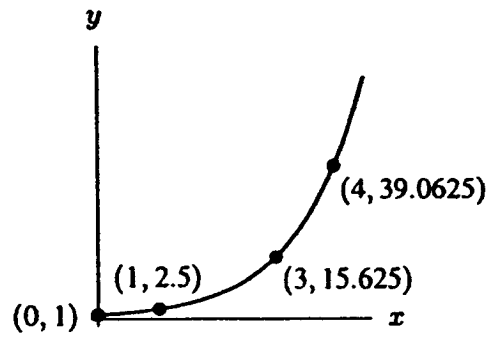
# TEST 1

1. Find a possible formula for each of the following functions. Check that your formula fits the data points.

(a)



(b)



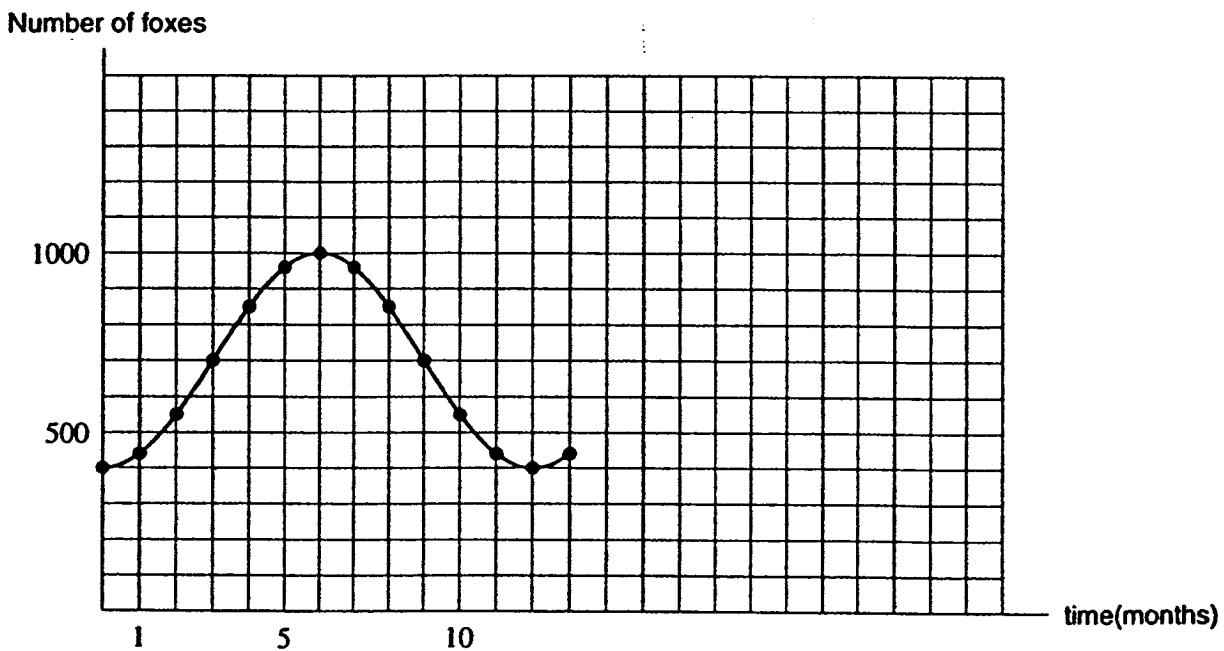
2. If  $g(x) = \sqrt{5x-1}$  and  $h(x) = 7x+3$ , then find:

(a)  $g(t^3-2)$

(c)  $h(g(1))$

(b)  $h(t)-2$

3. In nature, the population of two animals, one of which preys on the other (such as foxes and rabbits) are observed to oscillate with time, and are found to be well approximated by a trigonometric function. If the population of foxes is given by the graph below:



(a) Find the amplitude.

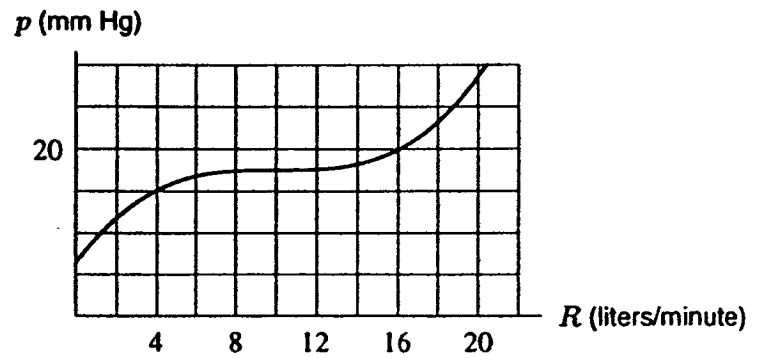
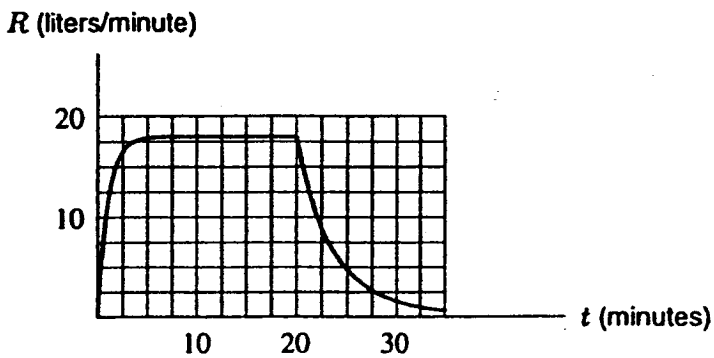
(b) Find the period.

(c) Give a formula for the function.

(d) Give an estimate for three times when the population is 500.

4. Solve for  $x$  if  $y = e + 2^x$ .

5. One of the graphs below shows the rate of flow,  $R$ , of blood from the heart in a man who bicycles for twenty minutes, starting at  $t = 0$  minutes. The other graph shows the pressure,  $p$ , in the artery leading to a man's lungs as a function of the rate of flow of blood from the heart.



- (a) Estimate  $p(R(10))$  and  $p(R(22))$ .  
(b) Explain what  $p(R(10))$  represents in practical terms.

6 Find each limit if it exists.

a.  $\lim_{x \rightarrow \infty} \frac{3x^2 - 7x}{5x^2 + 3}$

b.  $\lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3}$

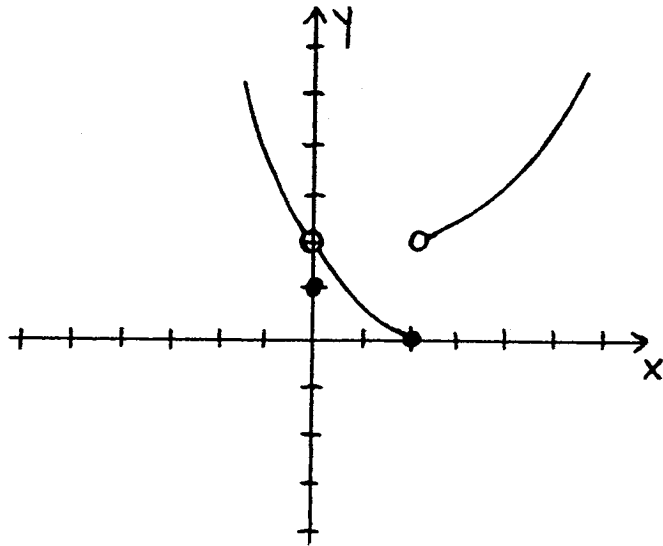
7. Using the graph of  $f(x)$ , find each limit if it exists.

a.  $\lim_{x \rightarrow 0} f(x)$

b.  $\lim_{x \rightarrow 2^-} f(x)$

c.  $\lim_{x \rightarrow 2^+} f(x)$

d.  $\lim_{x \rightarrow 2} f(x)$



# Bonus Problems.

1 Which of the following does *not* have a horizontal asymptote?

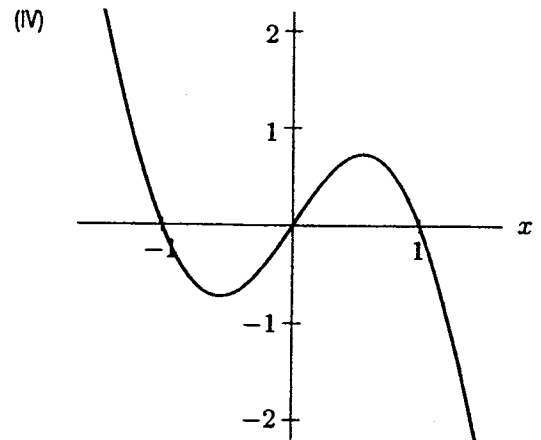
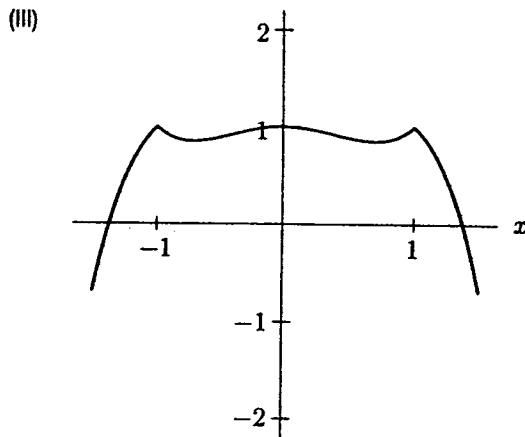
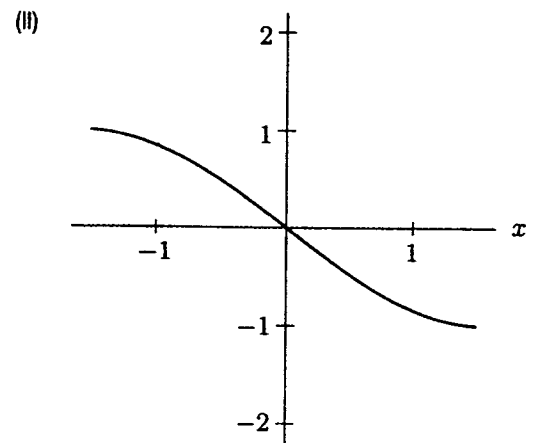
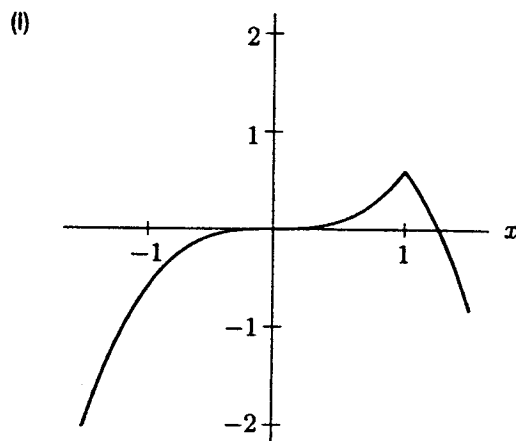
(a)  $y = \log x$

(b)  $y = \frac{1}{x}$

(c)  $y = 5^x$

(d)  $y = x^{1/3}$

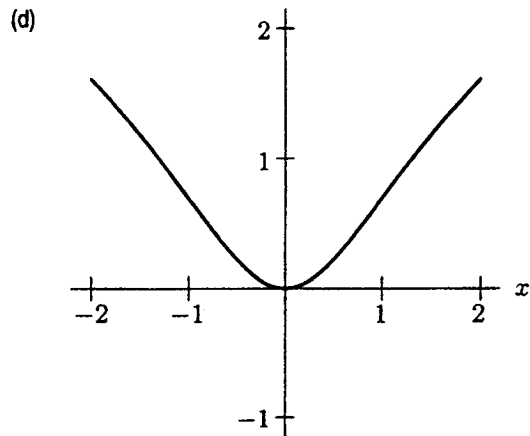
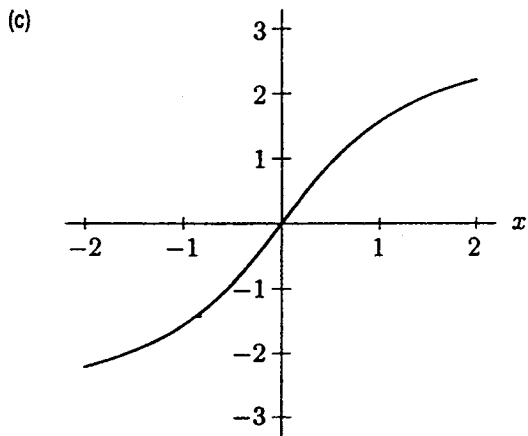
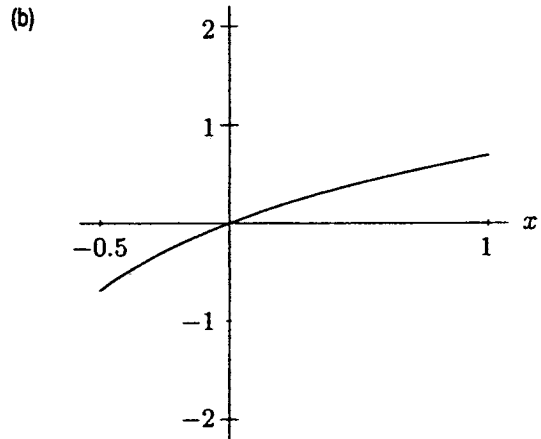
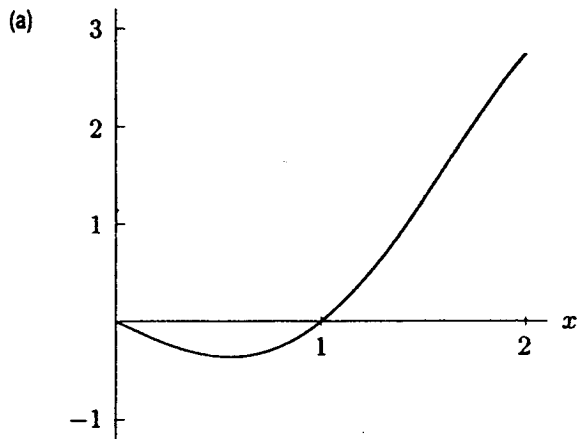
For Problems 2 – 3, consider the four graphs.



2. Which of these graphs could represent even functions?

3. Which of these graphs could represent odd functions?

4. Which of the following could be graphs of functions that have inverses?



For Problems 5-6, let  $f$  and  $g$  have values given in the table.

$x$	$f(x)$	$g(x)$
-2	1	-1
-1	0	1
0	-2	2
1	2	0
2	-1	-2

5.  $f(g(0)) =$

6. If  $f(g(x)) = 1$ , then  $x =$

7.  $\log\left(\frac{M-N}{M+N}\right) =$

- (a)  $2 \log M$
- (b)  $2 \log N$
- (c)  $-2 \log N$
- (d)  $\log(M-N) - \log(M+N)$

5 x 8 pts = 40 pts  
1 x 6 pts = 6 pts  
1 x 4 pts = 4 pts  

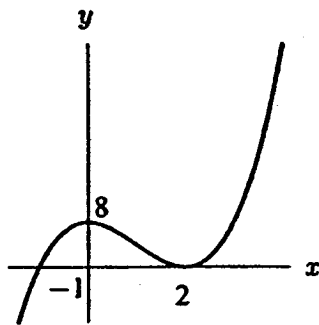
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50 pts

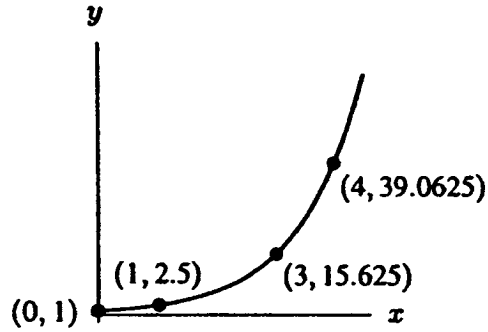
### TEST 1

8 1. Find a possible formula for each of the following functions. Check that your formula fits the data points.

(a)



(b)



$$(a) P(x) = a(x+1)(x-2)^2$$

$$P(0) = 8$$

$$a(-2)^2 = 8$$

$$a = 2$$

(b)

$$y = (2.5)^x$$

$$P(x) = 2(x+1)(x-2)^2$$

6 2. If  $g(x) = \sqrt{5x-1}$  and  $h(x) = 7x+3$ , then find:

(a)  $g(t^3-2) = \sqrt{5(t^3-2)-1} =$

$\sqrt{5t^3-11}$

(c)  $h(g(1)) = h(2) = 17$

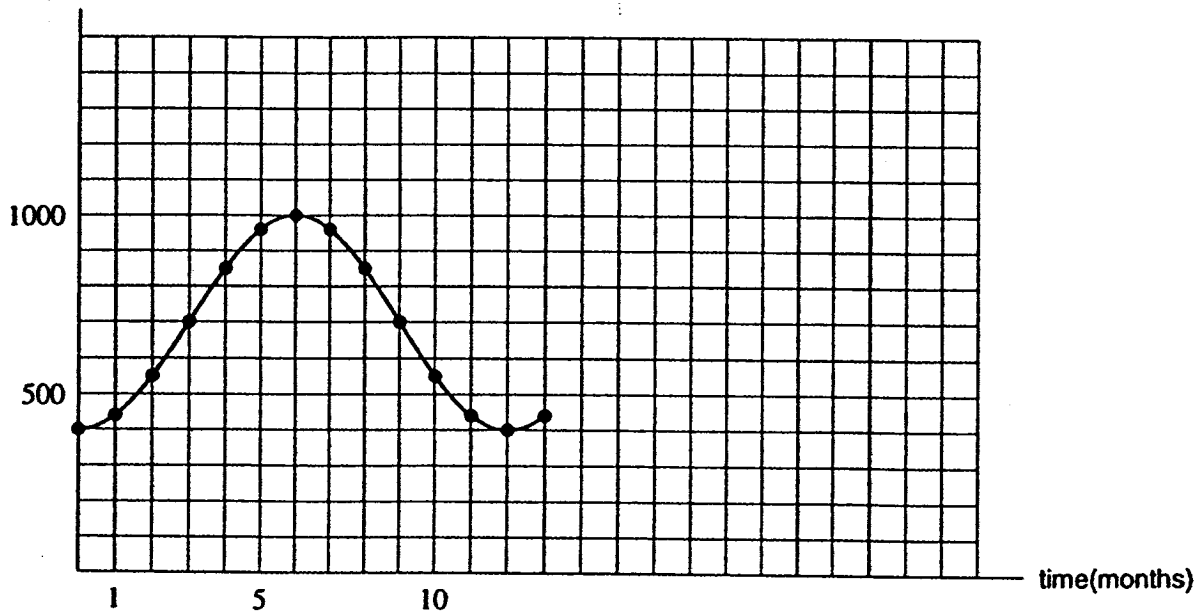
$h(g(1)) = h(\sqrt{5 \cdot 1 - 1}) = h(2) =$

$7 \cdot 2 + 3 = 17$

(b)  $h(t)-2 = 7t+3-2 = 7t+1$

8 3. In nature, the population of two animals, one of which preys on the other (such as foxes and rabbits) are observed to oscillate with time, and are found to be well approximated by a trigonometric function. If the population of foxes is given by the graph below:

Number of foxes



(a) Find the amplitude. 300

(b) Find the period. 12

(c) Give a formula for the function.  $N(t) = 700 - 300 \cos\left(\frac{\pi}{6}t\right)$

(d) Give an estimate for three times when the population is 500.

$t = 1.5, 10.5, 13.5$



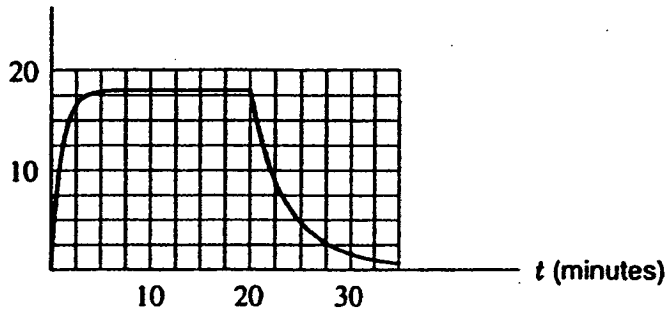
4. Solve for  $x$  if  $y = e + 2^x$ .

4

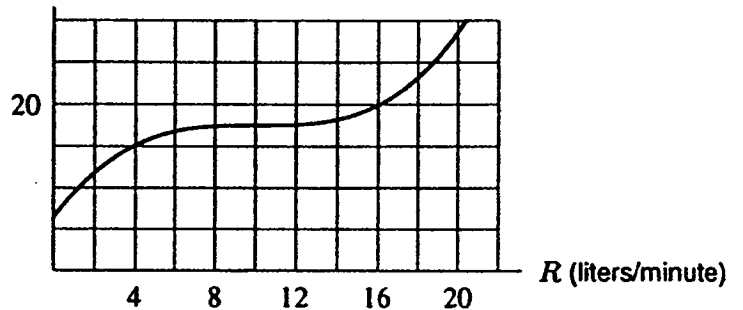
$$y - e = 2^x$$
$$\ln(y - e) = \ln 2^x$$
$$x = \frac{\ln(y - e)}{\ln 2}$$

8 5. One of the graphs below shows the rate of flow,  $R$ , of blood from the heart in a man who bicycles for twenty minutes, starting at  $t = 0$  minutes. The other graph shows the pressure,  $p$ , in the artery leading to a man's lungs as a function of the rate of flow of blood from the heart.

$R$  (liters/minute)



$p$  (mm Hg)



- (a) Estimate  $p(R(10))$  and  $p(R(22))$ .  
(b) Explain what  $p(R(10))$  represents in practical terms.

$$(a) \quad p(R(10)) = p(18) = 23 \text{ mmHg}$$
$$p(R(22)) = p(10) = 17.5 \text{ mmHg}$$

(b)  $p(R(10))$  represents the pressure in the artery after 10 min. of riding a bicycle.

8

6 Find each limit if it exists.

$$\text{a. } \lim_{x \rightarrow \infty} \frac{3x^2 - 7x}{5x^2 + 3} = \lim_{x \rightarrow \infty} \frac{3 + \frac{7}{x}}{5 + \frac{3}{x^2}} = \boxed{\frac{3}{5}}$$

$$\text{b. } \lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3} = \lim_{x \rightarrow -3} \frac{\cancel{(x+3)}(x-3)}{\cancel{x+3}} = \lim_{x \rightarrow -3} (x-3) = \boxed{-6}$$

8

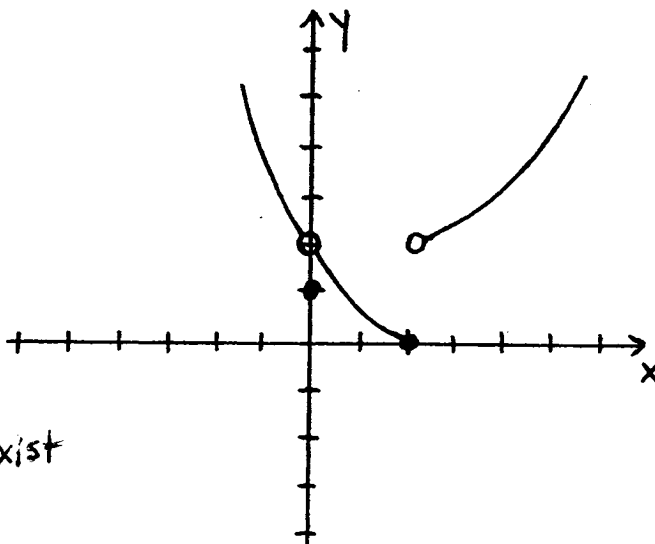
7. Using the graph of  $f(x)$ , find each limit if it exists.

$$\text{a. } \lim_{x \rightarrow 0} f(x) = 2$$

$$\text{b. } \lim_{x \rightarrow 2} f(x) = 0$$

$$\text{c. } \lim_{x \rightarrow 2} f(x) = 2$$

$$\text{d. } \lim_{x \rightarrow 2} f(x) \text{ doesn't exist}$$

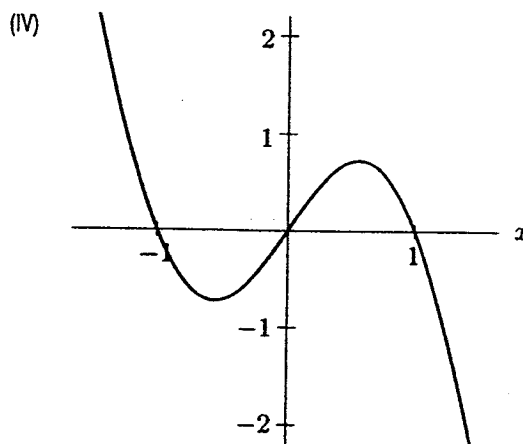
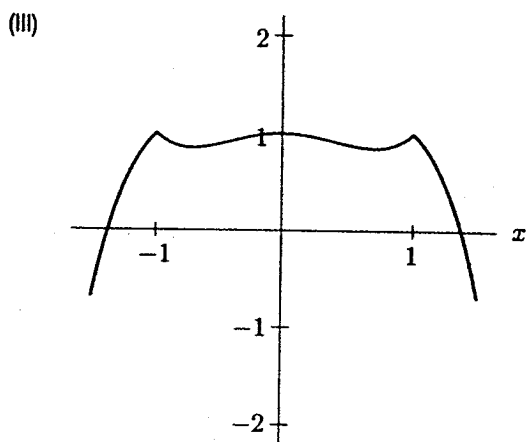
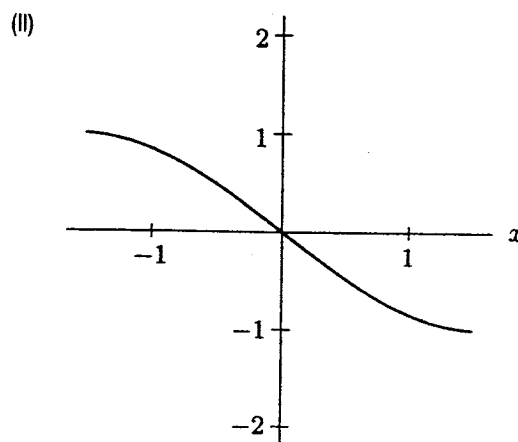
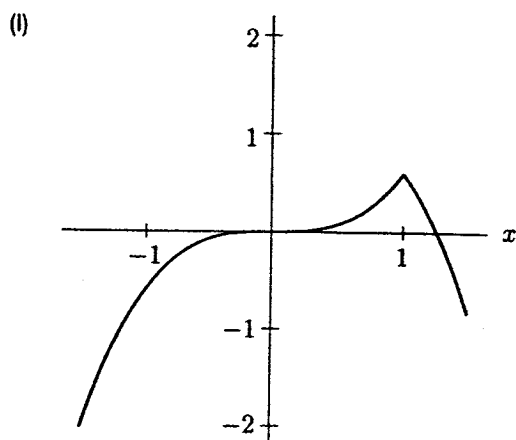


# Bonus Problems.

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- (a)  $y = \log x$
- (b)  $y = \frac{1}{x}$
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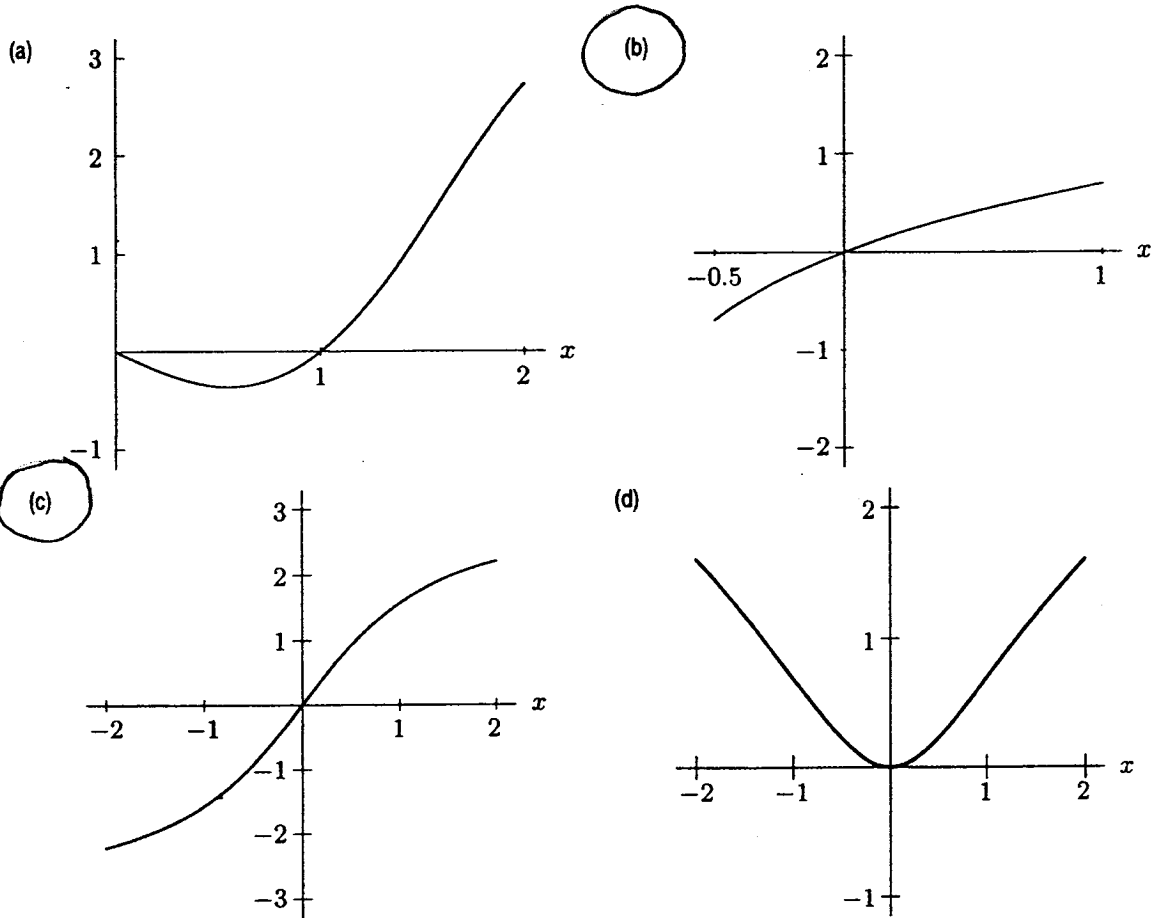
2. Which of these graphs could represent even functions?

III

3. Which of these graphs could represent odd functions?

II , IV

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For Problems 5–6, let  $f$  and  $g$  have values given in the table.

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5.  $f(g(0)) = -1$

6. If  $f(g(x)) = 1$ , then  $x = 2$

7.  $\log\left(\frac{M-N}{M+N}\right) =$

(a)  $2 \log M$

(b)  $2 \log N$

(c)  $-2 \log N$

(d)  $\log(M-N) - \log(M+N)$