

Name \_\_\_\_\_

### CYCLE #1 Parent Functions and Transformations

Without a calculator, set up the equation for, then sketch the graph of each of the following functions  $g(x)$  using any (or all) of the functions from the Catalog of Parent Functions. Be sure to show the important information like asymptotes, intercepts, and discontinuities. State the Domain and Range. No Calculator

1.  $g(x) = -f(x)$

2.  $g(x) = f(-x)$

3.  $g(x) = -f(-x)$

4.  $g(x) = 2f(x)$

5.  $g(x) = f(2x)$

6.  $g(x) = \frac{1}{2}f(2x)$

7.  $g(x) = f(x) + 2$

8.  $g(x) = f(x + 2)$

9.  $g(x) = f(x - 2) - 2$

10.  $g(x) = -3f(x) + 1$

11.  $g(x) = f(-3x - 3)$

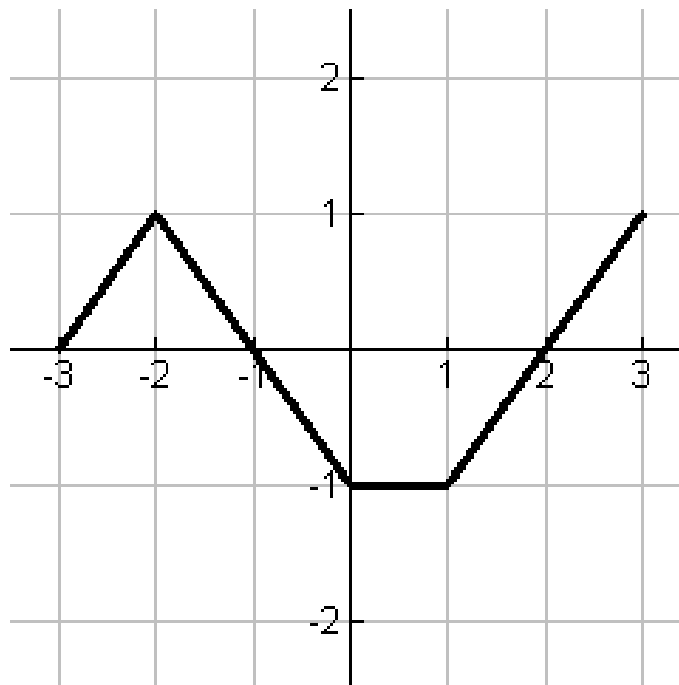
12.  $g(x) = 1 - 2f\left(\frac{x}{2}\right)$

13.  $g(x) = |f(x)|$

14.  $g(x) = f(|x|)$

15.  $g(x) = |f(|x|)|$

Now try some of the same transformations on the graph of the following function.



### Multiple Choice

\_\_\_\_\_ 16.  $\ln(x-2) < 0$  if and only if

- (A)  $x < 3$     (B)  $0 < x < 3$     (C)  $2 < x < 3$     (D)  $x > 2$     (E)  $x > 3$

\_\_\_\_\_ 17. If  $f(x) = e^x$ , which of the following lines is an asymptote to the graph of  $f$ ?

- (A)  $y = 0$    (B)  $x = 0$    (C)  $y = x$    (D)  $y = -x$    (E)  $y = 1$

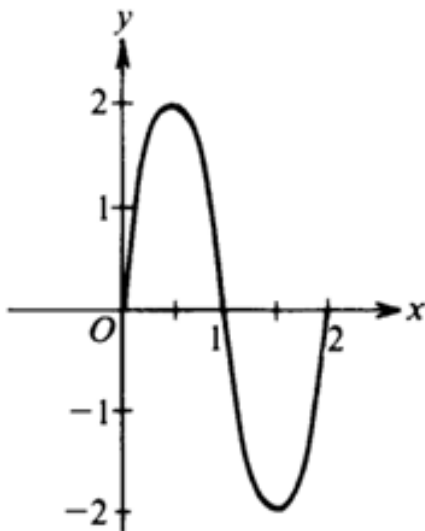
\_\_\_\_\_ 18. If the solutions of  $f(x) = 0$  are  $-1$  and  $2$ , then the solutions of  $f\left(\frac{x}{2}\right) = 0$  are

- (A)  $-1$  and  $2$    (B)  $-\frac{1}{2}$  and  $\frac{5}{2}$    (C)  $-\frac{3}{2}$  and  $\frac{3}{2}$    (D)  $-\frac{1}{2}$  and  $1$    (E)  $-2$  and  $4$

\_\_\_\_\_ 19. If  $f(x_1) + f(x_2) = f(x_1 + x_2)$  for all real numbers  $x_1$  and  $x_2$ , which of the following could define  $f$ ?

- (A)  $f(x) = x + 1$    (B)  $f(x) = 2x$    (C)  $f(x) = \frac{1}{x}$    (D)  $f(x) = e^x$    (E)  $f(x) = x^2$

- \_\_\_\_\_ 20. The figure below shows the graph of a sine function for one complete period. Which of the following is an equation for the graph?



- (A)  $y = 2\sin\left(\frac{\pi}{2}x\right)$  (B)  $y = \sin(\pi x)$  (C)  $y = 2\sin(2x)$  (D)  $y = 2\sin(\pi x)$  (E)  $y = \sin(2x)$
- \_\_\_\_\_ 21. Which of the following does NOT have a period of  $\pi$ ?
- (A)  $f(x) = \sin\left(\frac{1}{2}x\right)$  (B)  $f(x) = |\sin x|$  (C)  $f(x) = \sin^2 x$  (D)  $f(x) = \tan x$  (E)  $f(x) = \tan^2 x$

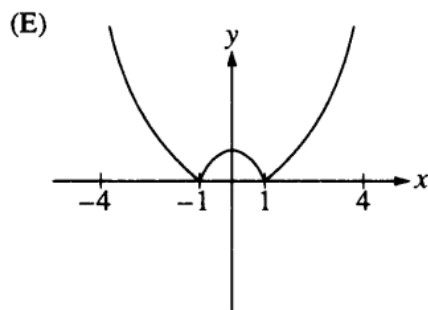
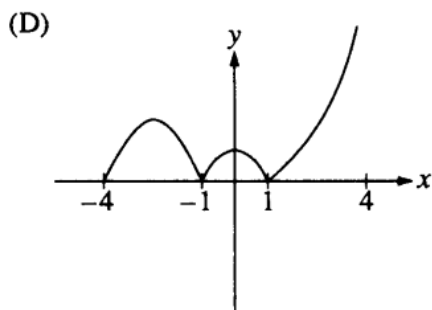
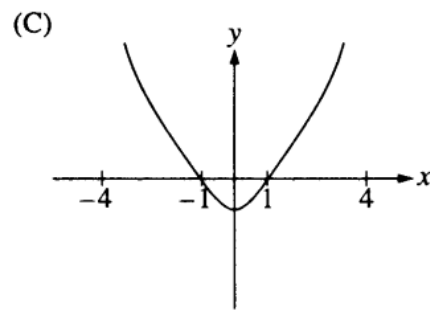
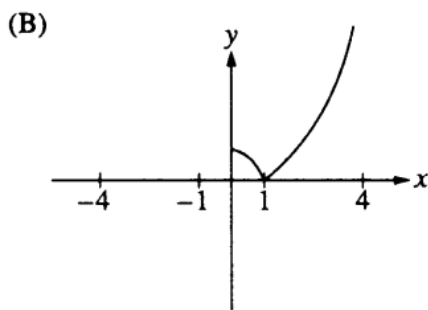
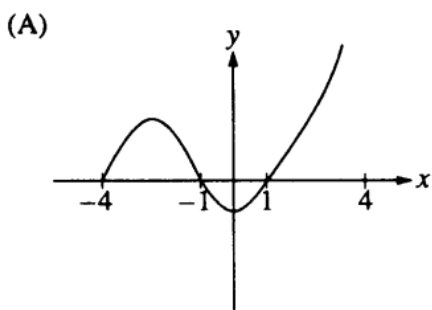
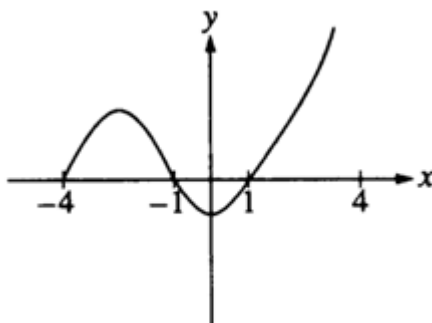
- \_\_\_\_\_ 22. The graph of which of the following equations has  $y = 1$  as an asymptote?

(A)  $y = \ln x$  (B)  $y = \sin x$  (C)  $y = \frac{x}{x+1}$  (D)  $y = \frac{x^2}{x-1}$  (E)  $y = e^{-x}$

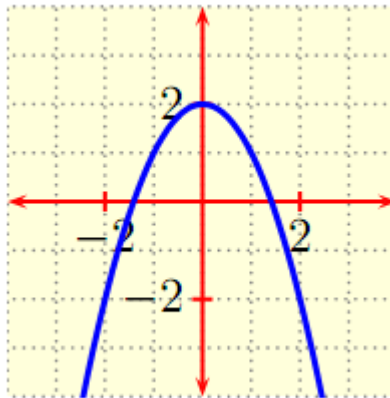
\_\_\_\_\_ 23. The fundamental period of  $2 \cos(3x)$  is

- (A)  $\frac{2\pi}{3}$  (B)  $2\pi$  (C)  $6\pi$  (D) 2 (E) 3

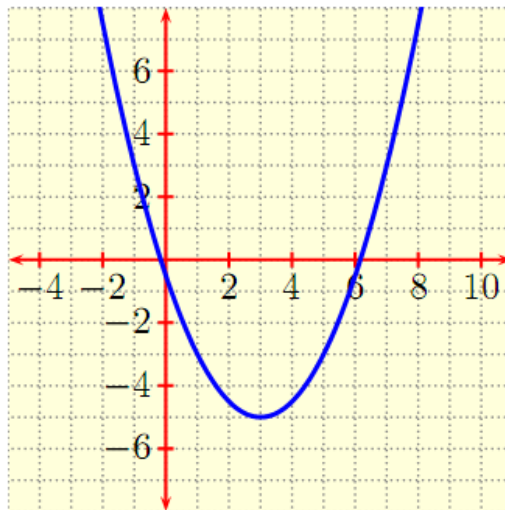
\_\_\_\_\_ 24. The graph of  $y = f(x)$  is shown in the figure below. Which of the following could be the graph of  $y = f(|x|)$ ?



25. If



is the graph of  $f(x)$ , which function  $g(x) = Af(x-C)+D$  has



as its graph?

- (A)  $g(x) = -f(x-3) - 5$     (B)  $g(x) = \frac{1}{2}f(x-3) - 4$     (C)  $g(x) = -\frac{1}{2}f(x+3) + 4$   
(D)  $g(x) = f(x-3) - 5$     (E)  $g(x) = -\frac{1}{2}f(x-3) - 4$     (F)  $g(x) = f(x+3) + 4$

- \_\_\_\_\_ 26. Find the function  $g$  that is finally graphed after the following sequence of transformations are applied in the order given to the graph of a function  $f$ .
- (1) reflect about the  $x$ -axis
  - (2) shift down 3 units
  - (3) stretch vertically by a factor of 2
  - (4) reflect about the  $y$ -axis
- (A)  $g(x) = 2f(x) - 6$     (B)  $g(x) = 2f(-x) + 6$     (C)  $g(x) = -2f(-x) - 6$   
(D)  $g(x) = -2f(x) + 6$     (E)  $g(x) = -3f(-x) + 6$