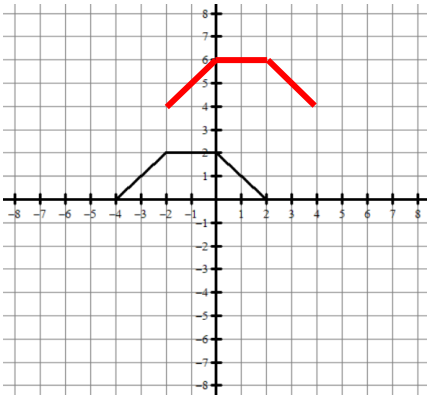
1.12A Translations of Functions

AP Precalculus

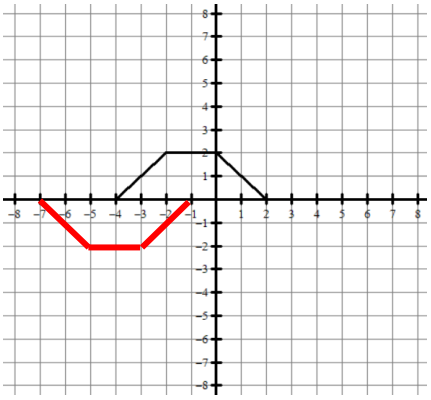
1.12A Practice

GRAPHICAL TRANSFORMATION. Use the graph of f to graph $g(x)$.

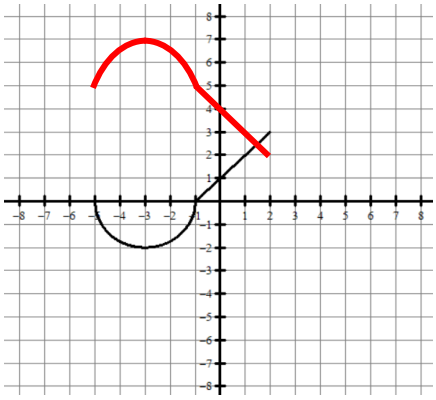
1. $g(x) = f(x-2) + 4$



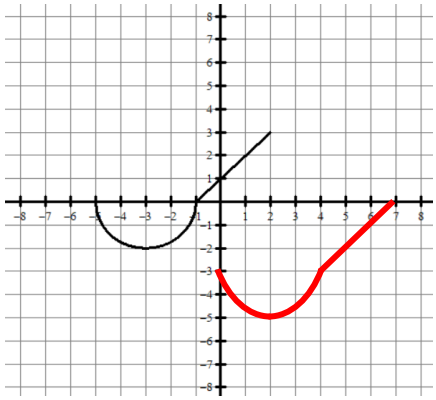
2. $g(x) = -f(x+3)$



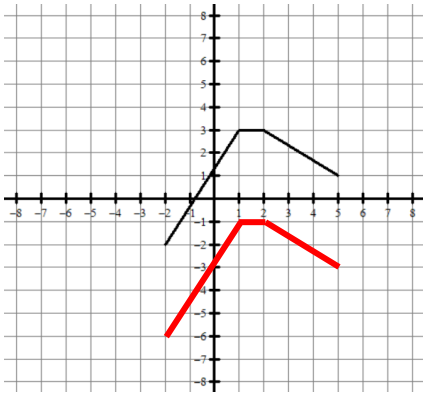
3. $g(x) = -f(x) + 5$



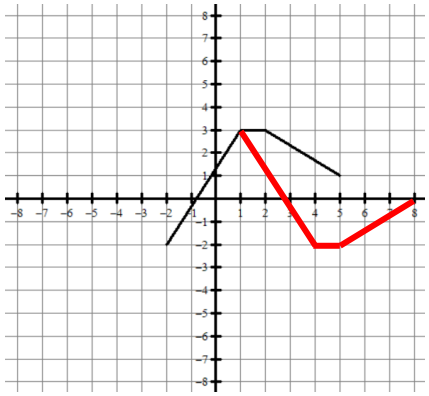
4. $g(x) = f(x-5) - 3$



5. $g(x) = f(x) - 4$



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



ALGEBRAIC TRANSFORMATION. Express the $g(x)$ in terms of x.

7. $f(x) = 4x + 3$

$g(x) = f(x) + 5$, find $g(x)$.

$g(x) = [4x + 3] + 5$

$g(x) = 4x + 8$

8. $f(x) = 2x - 5$

$g(x) = f(x+3) + 4$, find $g(x)$.

$g(x) = 2(x+3) - 5 + 4$

$g(x) = 2x + 6 - 1$

$g(x) = 2x + 5$

9. $f(x) = x^3 + 2x^2$

$g(x) = -f(x) + 5$, find $g(x)$.

$g(x) = -[x^3 + 2x^2] + 5$

$g(x) = -x^3 - 2x^2 + 5$

10. $f(x) = 2x^2 - 3x + 1$

$g(x) = f(x-2) + 5$, find $g(x)$.

$g(x) = [2(x-2)^2 - 3(x-2) + 1] + 5$

$g(x) = 2(x-2)(x-2) - 3x + 6 + 1 + 5$

$g(x) = 2(x^2 - 4x + 4) - 3x + 12$

$g(x) = 2x^2 - 8x + 8 - 3x + 12$

$g(x) = 2x^2 - 11x + 20$

NUMERIC TRANSFORMATION. Use the table of values to answer the following.

11. Given the table of values for f.

x	$f(x)$
-6	2
-3	8
2	15
5	-2
8	-13

Let $g(x) = f(x) + 2$, find $g(5)$.

$g(5) = f(5) + 2$

$g(5) = -2 + 2$

$g(5) = 0$

12. Given the table of values for f.

x	$f(x)$
0	0
1	2
2	4
3	8
4	16

Let $g(x) = f(x + 2) - 3$, find $g(1)$.

$g(1) = f(1+2) - 3$

$g(1) = f(3) - 3$

$g(1) = 8 - 3$

$g(1) = 5$

13. Given the table of values for f.

x	$f(x)$
-4	-32
-2	6
0	-8
2	21
4	14

Let $g(x) = -f(x - 2)$, find $g(4)$.

$g(4) = -f(4 - 2)$

$g(4) = -f(2)$

$g(4) = -21$

DOMAIN AND RANGE TRANSFORMATION. Find the domain and range of the transformed function.

14. Given the graph for f has a domain of $(-5,3]$ and range of $[-4,8]$.

Let $g(x) = f(x + 5)$.

Find the domain and range of $g(x)$.

Domain shifts left 5

$(-10,-2)$

Range has no change

$[-4,8]$

15. Given the graph for f has a domain of $(0,5)$ and range of $[-10,4]$.

Let $g(x) = f(x - 2) + 4$.

Find the domain and range of $g(x)$.

Domain shifts right 2

$(2,7)$

Range shifts up 4

$[-6,8]$

16. Given the graph for f has a domain of $[-2,4]$ and range of $(-1,8)$.

Let $g(x) = -f(x + 3) + 5$.

Find the domain and range of $g(x)$.

Domain shifts left 3

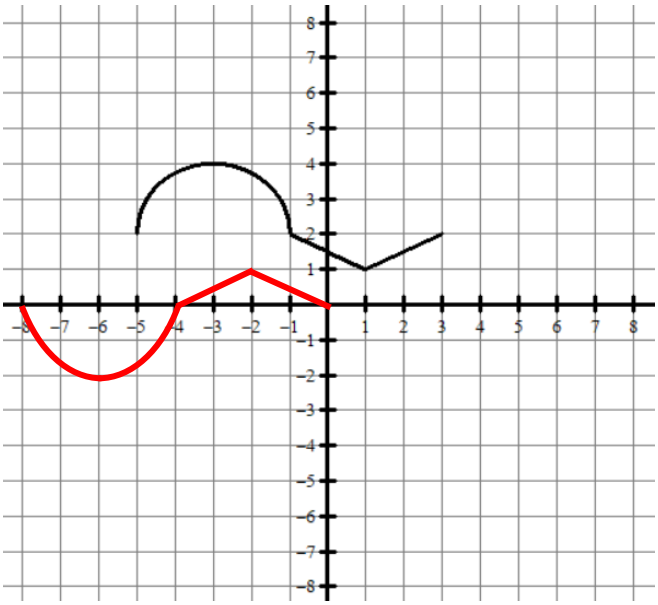
$[-5,1]$

Range flips vertically, shifts up 5

$(-1,8) \rightarrow (1,-8) \rightarrow (6,-3) = (-3,6)$

Use the graph f to answer the following.

17.



Let the $g(x) = -f(x + 3) + 2$

a. Graph the $g(x)$.

b. State the domain of $g(x)$. $[-8,0]$

c. State the range of $g(x)$. $[-2,1]$

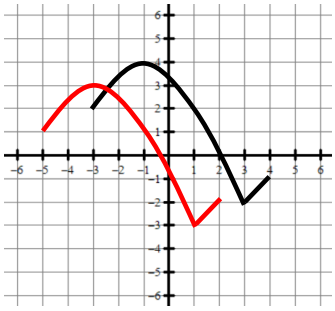
d. Find $g(-2)$. $= 1$

e. Find the zeroes of $g(x)$. $x = -8, -4, 0$

f. Find the y-intercept of $g(x)$. 0

Multiple Choice

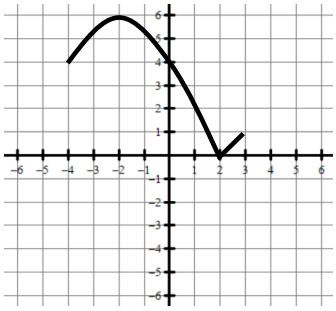
18. The graph of $y = f(x)$ is shown for $-3 \le x \le 4$.



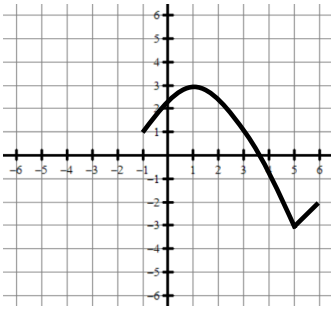
Which of the following is the transformed graph for $y = f(x+2) - 1$?

left 2 down 1

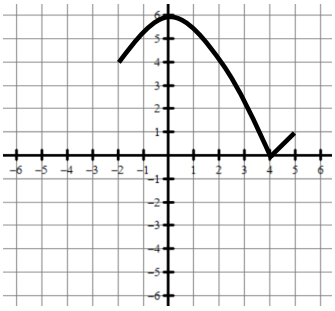
(A)



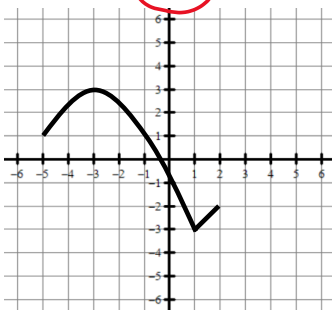
(B)



(C)



(D)



19. The functions f and g are defined for all real numbers such that $g(x) = -f(x) + 5$. Which of the following sequences of transformations maps the graph of f to the graph of g in the same xy-plane?

(A) A horizontal translation of the graph of f by 5 units, followed by a vertical reflection of the graph of f.

(B) A vertical translation of the graph of f by 5 units, followed by a vertical reflection of the graph of f.

(C) A vertical reflection of the graph of f, followed by a horizontal translation of the graph of f by 5 units.

(D) A vertical reflection of the graph of f, followed by a vertical translation of the graph of f by 5 units.

20. The function f is given by $f(x) = -x^2 + 3x + 2$. The graph of which of the following functions is the image of the graph of f after a vertical translation of the graph of f by 4 units ? $f(x) + 4$

(A) $m(x) = -(x+4)^2 + 3(x+4) + 2$, because this is an additive transformation of f that results from adding to each input value of x.

(B) $n(x) = -(x-4)^2 + 3(x-4) + 2$, because this is an additive transformation of f that results from adding to each input value of x.

(C) $p(x) = -x^2 + 3x + 6$, because this is an additive transformation of f that results from adding to the $f(x)$.

(D) $q(x) = -x^2 + 3x - 2$, because this is an additive transformation of f that results from adding to the $f(x)$.