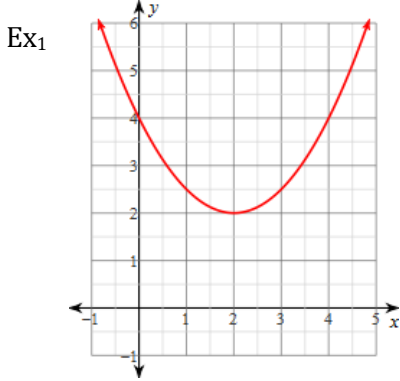


Quadratic Average Rate of Change

Unlike linear functions, quadratic functions do not have a constant rate of change between all points. However, the average rate of change can be identified between a specific points of non-linear functions.

The formula is $m = \frac{f(b)-f(a)}{b-a}$, where a is the first x coordinate value and b is the second x coordinate value.



$$f(x) = \frac{1}{2}x^2 - 2x + 4; [0, 2] \text{ Where } a = 0 \text{ and } b = 2.$$

$$m = \frac{\frac{1}{2}(2^2 - 2(2) + 4) - [\frac{1}{2}(0^2 - 2(0) + 4)]}{2 - 0} = \frac{2 - 4}{2} = \frac{-2}{2} = -1$$

The table illustrates the interval $[0, 2]$ are points $(0, 4)$ and $(2, 2)$. $\frac{\Delta(f(x))}{\Delta x} = \frac{2-4}{2-0} = \frac{-2}{2} = -1$.

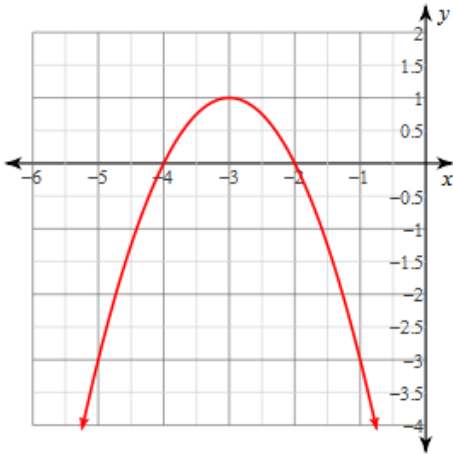
x	f(x)
0	4
1	2.5
2	2
3	2.5
4	4
5	6.5

Δx
2

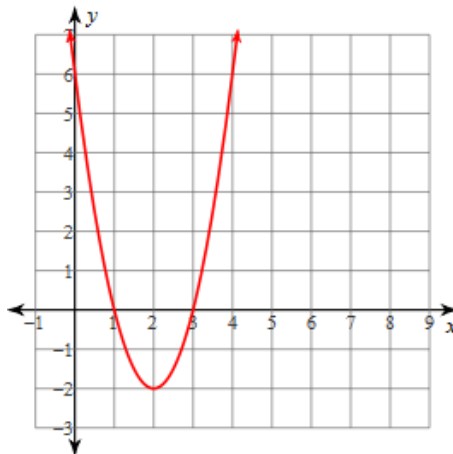
$\Delta f(x)$
-2

Determine the average rate of change given the interval.

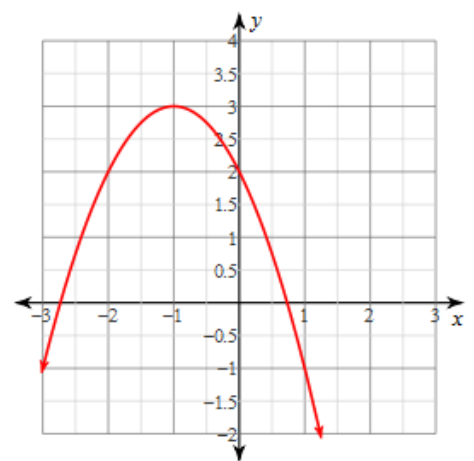
1. $f(x) = -x^2 - 6x - 8$
 $[-5, -3]$ _____



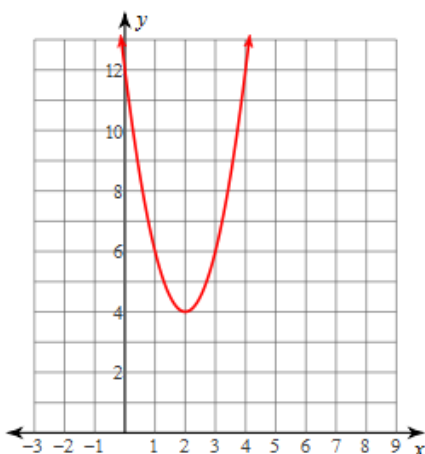
2. $f(x) = 2x^2 - 8x + 6$
 $[0, 3]$ _____



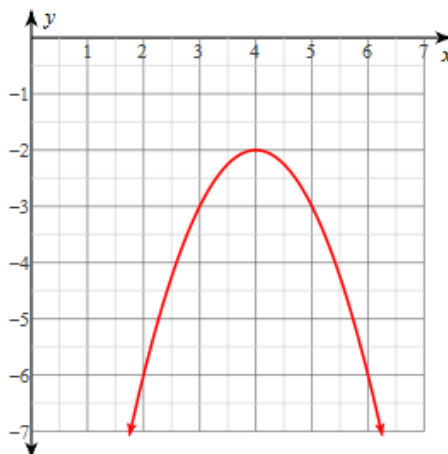
3. $f(x) = -x^2 - 2x + 2$
 $[-2, -1]$ _____



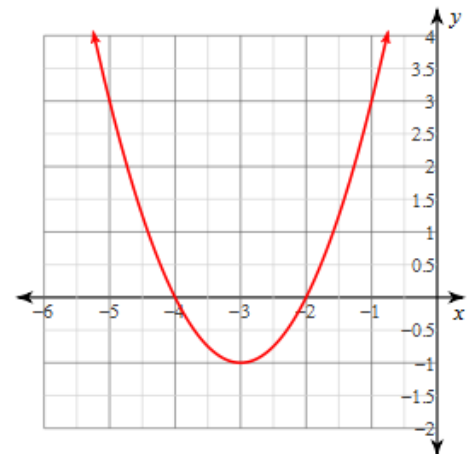
4. $f(x) = x^2 - 8x + 12$
 $[2, 4]$ _____



5. $f(x) = -x^2 + 8x - 18$
 $[2, 6]$ _____



6. $f(x) = x^2 + 6x + 8$
 $[-5, -2]$ _____



Determine the average rate of change given the interval. Show your work below each problem.

7. $f(x) = -2x^2 - 8x - 4$
 $[-4, -2]$ _____

8. $f(x) = x^2 - 4x + 7$
 $[0, 3]$ _____

9. $f(x) = x^2 - 6x + 8$
 $[3, 5]$ _____

10. $f(x) = \frac{1}{2}x^2 + \frac{3}{2}x - 1$
 $[-3, 0]$ _____

11. $f(x) = -x^2 - 7x - 14$
 $[-4, -2]$ _____

12. $f(x) = 3x^2 - 9x + 2$
 $[2, 3]$ _____

13. $f(x) = -x^2 - 7x - 14$
 $[-4, -2]$ _____

14. $f(x) = -\frac{1}{4}x^2 - \frac{3}{4}x - 3$
 $[-4, 0]$ _____

15. $f(x) = -2x^2 - 18x - 44$
 $[-5, -3]$ _____

16. $f(x) = \frac{1}{2}x^2 + x - 8$
 $[-1, 2]$ _____

x	f(x)
-2	-8
-1	-8.5
0	-8
1	-6.5
2	-4
3	-0.5

17. $f(x) = -\frac{1}{4}x^2 + 2x + 1$
 $[0, 3]$ _____

x	f(x)
-2	-4
-1	-1.25
0	-1
1	-2.75
2	4
3	4.75

18. $f(x) = -3x^2 - x + 5$
 $[-2, 3]$ _____

x	f(x)
-2	-5
-1	3
0	5
1	1
2	-9
3	-25

19. $f(x) = -x^2 + x - 6$
 $[-2, 3]$ _____

x	f(x)
-2	-12
-1	-8
0	-6
1	-6
2	-8
3	-12

20. $f(x) = \frac{2}{3}x^2 - 2x + 4$
 $[-3, 3]$ _____

x	f(x)
-6	40
-3	16
0	4
3	4
6	16
9	40

21. $f(x) = -4x^2 - 3x - 2$
 $[-4, 5]$ _____

x	f(x)
-4	-54
-2	-12
0	-2
4	-78
5	-117
7	-219