

Miss Helbing's Chapter 7 Review!

1. Let  $f(x) = 2x^2 \pm 3x + 2$ . Write an expression involving  $\Delta x$  that you can use to find the average rate of change of the function  $f$  from  $x$  to  $x + \Delta x$ .

2. Algebraically, simplify the expression that you found in question 1.

3. The expression  $\frac{((x + \Delta x)^2 + 3(x + \Delta x) + 2) - (x^2 + 3x + 2)}{\Delta x}$  can be used to find the average rate of change of the function  $g(x) = x^2 + 3x + 2$  from  $x$  to  $x + \Delta x$ . Write an expression involving a limit that could be simplified to get a formula for  $g'(x)$ .

4. Find the derivative of the problem stated above.

5. Use the fact that the derivative of  $f(x) = 3x^2 \pm 4x^3 + 4$  is  $f'(x) = 6x \pm 12x^2$  to determine the largest interval on which  $f$  is increasing.

6. The table below gives the number of turkeys sold by a neighborhood market in successive years during the two weeks before Thanksgiving.

Year	Number of Turkeys
2001	253
2002	267
2003	272
2004	311
2005	315
2006	412
2007	481
2008	461

Find the average rate of change in the number of turkeys sold from 2004 to 2007.

7. For this problem, refer to the table immediately above.  
Between which two years was the average rate of change the greatest?
8. A rock falls from 43 meters above the ground from a cliff overhang. The height of the rock above the ground below at time  $t$  seconds is given by  $h(t) = \pm 4.9t^2 + 43$ . Find  $h'(2)$ , including units, and explain what it means in this context.

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9. The distance  $d$  in feet that Jim's old car travels in terms of its velocity  $v$  in feet per second is given by  $d(v) = 2.1v^2$ . Find  $d'(4.5)$ , including units, and explain what it means in this context.

An object is shot into the air so that its height (in feet) after  $t$  seconds is given by  $h(t)$ .

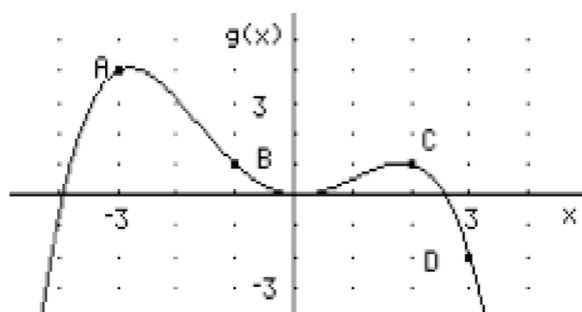
10. Let  $h(t) = \pm 16t^2 + 42.3t + 7$ . Use the Derivative of a Quadratic function theorem to find a formula for  $h'(t)$ .
11. If  $h'(t) = \pm 32t + 4$ , after how many seconds does the object reach its maximum height?
12. Let  $h(t) = \pm 16t^2 + 25.3t + 157$ . If the object reaches its maximum height in 3 seconds, what is its maximum height?

Milo uses fencing to enclose a rectangular playground.

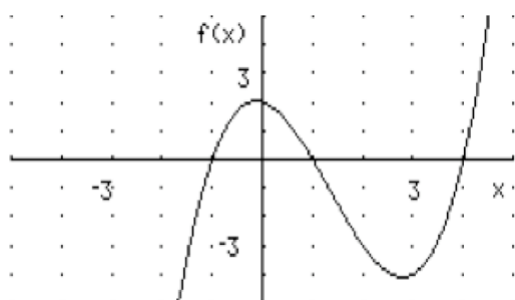
13. The area of the playground is given by  $A(x) = 140x \pm x^2$ . Use the Derivative of a Quadratic Function Theorem to find a formula for  $A'(x)$ .
14. The length  $x$  and width  $y$  represent the dimensions of the playground. The derivative of the area function is  $A'(x) = 120 \pm 2x$ . What is the length of the playground of maximum area?
15. A formula for the area he can enclose is  $A(x) = 210x \pm x^2$ , where  $x$  is the length. If the playground has a maximum length of 105 feet, what is its maximum area?

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Use the graph of function  $g$  shown below.

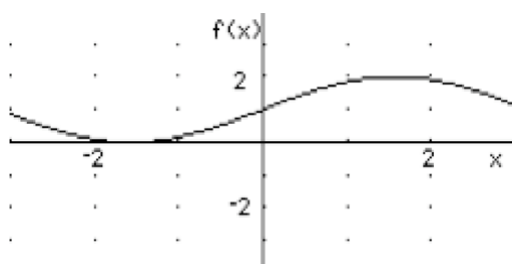


16. What is the average rate of change in  $g$  from point  $A$  to point  $B$ ?
17. With two of the labeled points as endpoints, over what interval is the average rate of change in  $g$  equal to zero?
18. Draw a tangent line to the graph of the function  $f$  at  $x = \pm 1$  and use it to estimate  $f'(\pm 1)$ .



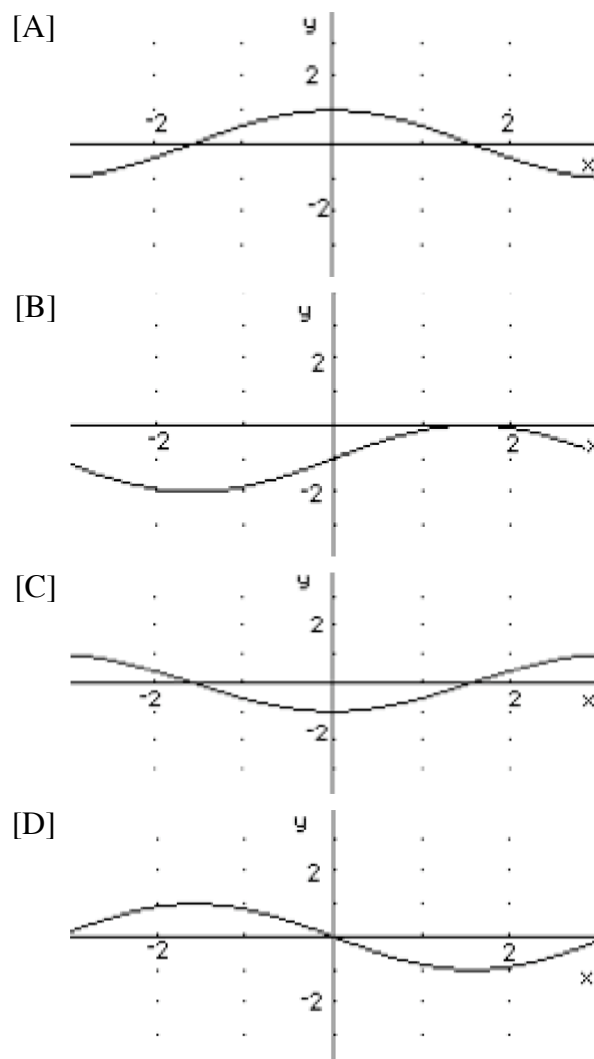
*Multiple Choice*

19. The graph of  $f$  is shown below.



Which of the graphs could be the graph of  $f'$ ?

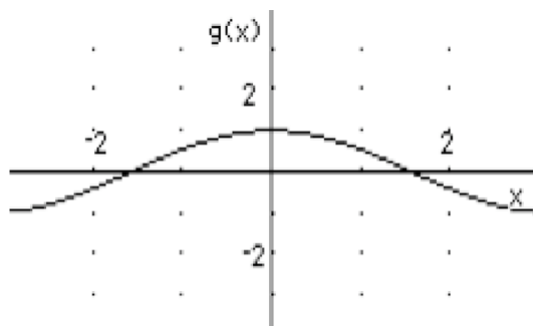
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(19.)

*Multiple Choice*

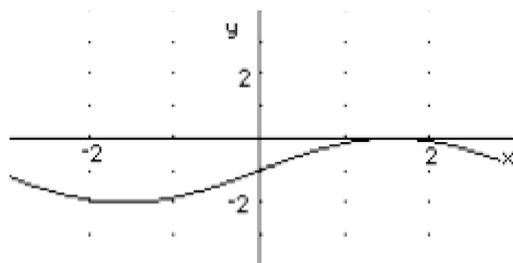
20. The graph of  $g$  is shown below.



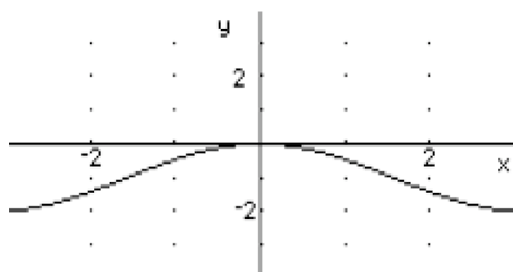
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(20.) Which of the graphs could be the graph of  $g'$ ?

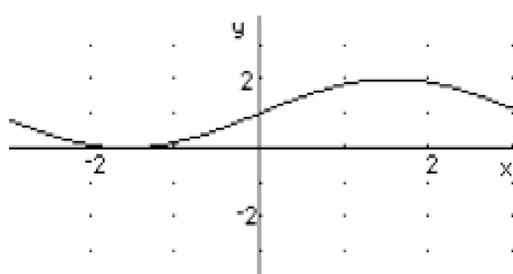
[A]



[B]



[C]



[D]

