U1 L5B Average Rate of Change; Even & Odd Functions — Practice

Name: _____ HR: _____

Skills: Determine where f(x) ≥ 0, find the average rate of change between two points, interpret it in context, and determine algebraically whether a function is even, odd, or neither.

Group A — Where Is f(x) ≥ 0? (with Review)

Graph each function in Desmos or on the TI-84 and determine the interval(s) for which f(x) ≥ 0. Use the zeros to set the endpoints.

1. $f(x) = 9 - x^2$

f(x) ≥ 0 on: _____

2. $f(x) = x^2 - 4x$

f(x) ≥ 0 on: _____

3. $f(x) = \sqrt{x - 1}$

f(x) ≥ 0 on: _____

4. $f(x) = |x + 5|$

f(x) ≥ 0 on: _____

5. Review (from 1.5A): $f(x) = 4x^3 - 24x^2 - x + 6$

Find the zeros algebraically. Then use them to find where f(x) ≥ 0.

Zeros: _____ ***f(x) ≥ 0 on:*** _____

Sketch a graph of 5.

Group B — Average Rate of Change

Find the average rate of change of each function from x_1 to x_2. Show the set-up and substitution into $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$

6. $f(x) = -2x + 15$

from $x_1 = 0$ to $x_2 = 3$

Average rate of change = _____

7. $f(x) = x^2 - 2x + 8$

from $x_1 = 1$ to $x_2 = 5$

Average rate of change = _____

8. $f(x) = x^3 - 3x^2 - x$

from $x_1 = -1$ to $x_2 = 2$

Average rate of change = _____

9. $f(x) = -x^3 + 6x^2 + x$

from $x_1 = 1$ to $x_2 = 6$

Average rate of change = _____

10. Research and Development. The amounts (in billions of dollars) the U.S. federal government spent on research and development for defense from 2010 through 2014 can be approximated by the model $y = 0.5079t^2 - 8.168t + 95.08$, where t represents the year, with t = 0 corresponding to 2010. (Source: American Association for the Advancement of Science)

Find the average rate of change of the model from 2010 to 2014. Interpret your answer in the context of the problem.

Average rate of change = _____ ***Units:*** _____

Interpretation: _____

Group C — Even, Odd, or Neither? (Algebraically) *Find f(−x) and simplify. Compare it to f(x) and −f(x) to decide whether the function is even, odd, or neither, then describe the symmetry (y-axis, origin, or none). Check by graphing. (Textbook #71–74, 76, 77, 79, 81)*

11. $f(x) = x^6 - 2x^2 + 3$

$f(-x) =$

Circle: Even Odd Neither Symmetry: _____

12. $g(x) = x^3 - 5x$

$g(-x) =$

Circle: Even Odd Neither Symmetry: _____

13. $h(x) = x\sqrt{x+5}$

$h(-x) =$

Circle: Even Odd Neither Symmetry: _____

14. $f(x) = x\sqrt{1-x^2}$

$f(-x) =$

Circle: Even Odd Neither Symmetry: _____

15. $g(s) = 4s^{2/3}$

$g(-x) =$

Circle: Even Odd Neither Symmetry: _____

16. $f(x) = -9$

$f(-x) =$

Circle: Even Odd Neither Symmetry: _____

17. $f(x) = -|x-5|$

$f(-x) =$

Circle: Even Odd Neither Symmetry: _____

18. $f(x) = \sqrt[3]{4x}$

$f(-x) =$

Circle: Even Odd Neither Symmetry: _____

Group D — Find the Mistake *Read the student's work carefully. Explain the error, then determine whether the function is even, odd, or neither. (Textbook #87)*

19. Error Analysis. A student says $f(x) = 2x^3 - 5$ is odd because $f(-x) = -f(x)$, as shown:

$f(-x) = 2(-x)^3 - 5$

$= -2x^3 - 5$

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

$= -f(x)$

Describe the error:

Correct answer — circle: Even Odd Neither