

Name _____
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Date _____
Algebra II

Functions Review Sheet

1. The function $v(x) = x(3 - x)(x + 4)$ models the volume, in cubic inches, of a rectangular solid for $0 \leq x \leq 3$. To the *nearest tenth of a cubic inch*, what is the maximum volume of the rectangular solid?

2. A manufacturer of sweatshirts finds that profits and costs fluctuate depending on the number of products created. The manufacturer determines the profit, $p(x)$, in thousands of dollars, as a function of the number of sweatshirts sold, x , in thousands. This function, p , is given below. Over the interval $0 \leq x \leq 9$, state the maximum profit and round to the *nearest integer*.

$$p(x) = -x^3 + 11x^2 - 7x - 69$$

3. Over which intervals is the graph of $f(x) = -x^4 + 15x^2 - 7$ strictly decreasing?

- 1) $(-2.7, 0)$
- 2) $(-\infty, -2.5)$
- 3) $(2.5, \infty)$
- 4) $(-1.4, 1.2)$

4. Over which intervals is the graph of $f(x) = x^3 + 8x^2 + 3x - 8$ strictly decreasing?

- 1) $(-6, 0)$
- 2) $(-\infty, -6)$
- 3) $(-.2, \infty)$
- 4) $(-5.1, -.2)$

5. Which value, to the *nearest tenth*, is an approximate solution for the equation $f(x) = g(x)$, if

$$f(x) = \frac{5}{x-3} \text{ and } g(x) = 2(1.3)^x?$$

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|--------|--------|
| 1) 3.2 | 3) 4.0 |
| 2) 3.9 | 4) 5.6 |

6. If $p(x) = 2\ln(x) - 1$ and $m(x) = \ln(x+6)$, then what is the solution for $p(x) = m(x)$?

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| 1) 1.65 | 3) 5.62 |
| 2) 3.14 | 4) no solution |

7. The function $f(x) = \sqrt{x}$. Which function represents a shift of the graph left 3 units and up 2 units?

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|----------------------------|----------------------------|
| 1) $g(x) = \sqrt{x-3} - 2$ | 3) $g(x) = \sqrt{x+2} - 3$ |
| 2) $g(x) = \sqrt{x+3} + 2$ | 4) $g(x) = \sqrt{x-2} + 3$ |

8. Joey's math class is studying the basic quadratic function, $f(x) = x^2$. Each student is supposed to make two new functions by adding or subtracting a constant to the function. Joey chooses the function $g(x) = (x+2)^2 - 5$. What transformations would map $f(x)$ to $g(x)$?

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|--------------------------------|-------------------------------|
| 1) shift left 2, shift down 5 | 3) shift right 5, shift up 2 |
| 2) shift right 2, shift down 5 | 4) shift left 5, shift down 2 |

9. A manager wanted to analyze the online shoe sales for his business. He created a graph to model the data, as shown below. Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.



10. The population, $P(t)$, of a town increased according to the function $P(t) = 12,000(1.03)^t$, where t is the number of years since 2000. Find the average rate of change from $t = 10$ to $t = 20$ rounding to the nearest integer. Explain its meaning in the context of the problem.

11. The table below shows the number of hours of daylight on the first day of each month in Rochester, NY. Given the data, what is the average rate of change in hours of daylight per month from January 1st to April 1st? Interpret what this means in the context of the problem.

Month	Hours of Daylight
Jan.	9.4
Feb.	10.6
March	11.9
April	13.9
May	14.7
June	15.4
July	15.1
Aug.	13.9
Sept.	12.5
Oct.	11.1
Nov.	9.7
Dec.	9.0

12. Given $f(x) = \frac{1}{2}x + 8$, which equation represents the inverse, $g(x)$?

1) $g(x) = 2x - 8$

3) $g(x) = -\frac{1}{2}x + 8$

2) $g(x) = 2x - 16$

4) $g(x) = -\frac{1}{2}x - 16$

13. The inverse of $f(x) = -6x + \frac{1}{2}$ is

1) $f^{-1}(x) = 6x - \frac{1}{2}$

3) $f^{-1}(x) = -\frac{1}{6}x + \frac{1}{12}$

2) $f^{-1}(x) = \frac{1}{-6x + \frac{1}{2}}$

4) $f^{-1}(x) = -\frac{1}{6}x + 2$

Determine whether the following are even functions, odd functions, or neither. Explain your answer.

14. $f(x) = \left(\frac{1}{2}\right)^x$

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

16. $f(x) = \frac{2}{x}$

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

18. $f(x) = -|x| - 6$

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

20. The expression $(x + i)^2 - (x - i)^2$ is equivalent to

- 1) 0 3) -2
2) $-2 + 4xi$ 4) $4xi$

21. The expression $6xi^3(-4xi + 5)$ is equivalent to

- 1) $2x - 5i$ 3) $-24x^2 + 30x - i$
2) $-24x^2 - 30xi$ 4) $26x - 24x^2i - 5i$

22. Which value is *not* contained in the solution of the system shown below?

$$4x - 5y + 2z = 130$$

$$3x + 2y - 7z = -99$$

$$10x - 6y - 4z = 112$$

- 1) -8 3) 10
2) -12 4) 15

23. Which value is contained in the solution of the system shown below?

$$3x + y + z = -4$$

$$x - 2y + z = -5$$

$$2x + 3y - 2z = -9$$

- 1) -3 3) -5
2) -4 4) -9