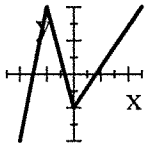
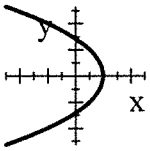
Alg 2 Final Exam Review Fall 2019

1. Write the equation of the inverse relation for each function.

a) $f(x) = \frac{2x^3 - 3}{5}$ b) $y = -4x - 7$ c) $y = 4 \cdot \sqrt{5x + 8} - 9$ d) $y = 10\left(\frac{x + 8}{7}\right)^5$

2. Tell if the inverse relation of each graph or equation is a function or not.

a) 

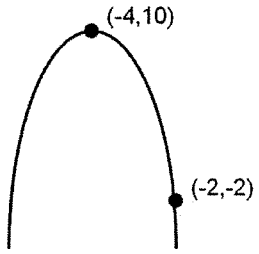
b) 

c) $f(x) = -(x - 1)^2(x + 2)^2 + 5$

3. Use the given information to find the value of each.

a) $f(x) = \frac{x + 4}{7}$ find $f^{-1}(2)$ b) $f(x) = \sqrt{\frac{2x + 1}{5}}$ find $f^{-1}(3)$

4. Write the equation of this parabola in Vertex Form: $y = a(x - h)^2 + k$



5. $g(x)$ is a transformation of $f(x) = x^2$. Write the equation of $g(x)$ if these are the tranformations that were applied:

- Half as tall
- Moved four units left and 7 units down.
- x-axis reflection.

6. $g(x)$ is a transformation of $f(x)$. If $f(x) = -4f(x - 5) - 8$ and $g(x) = -12f(x + 1) + 2$ describe ALL of the transformations performed on $f(x)$ in order to create $g(x)$.

7. Use this function: $y = x^4 - 3x^3 - 4x^2 + 8x + 7$

a) State the coordinates of all Absolute Max, Absolute Min, Relative Max, and Relative Min, if any. Round to the nearest hundredth as necessary.

b) State all intervals of increasing and decreasing.

8. Determine if each function is ODD, EVEN, or NEITHER.

a) $y = x^2 + 8x + 10$ b) $y = \frac{4}{x^3 + x}$ c) $y = -\sqrt{x^4 - 10} + 3$

9. A rock climber is climbing a vertical rock wall. The following equation gives the climbers height (in feet) as a function of time (minutes): $h(t) = x^3 - 12x^2 + 35x + 15$. Find the rate of change on the following interval and describe what it means in this situation: $2 \le t \le 6$.

10. State the end behavior of each polynomial:

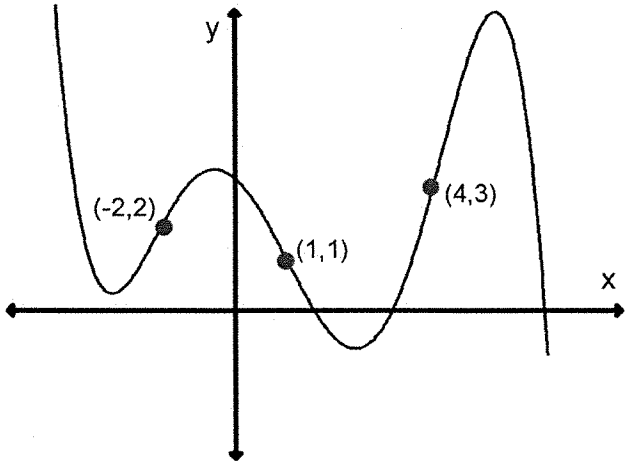
a) $y = 6x^4 - 7x^3 + 8x - 12$

b) $y = -13x^5 - 42x^3 - 108x^2 - 99$

c) $y = 4x(x+3)(x-8)^2(x+2)^3$

d) $y = -3x^2(x-5)^2(2x+7)^3(x+4)$

11. Use the graph at the right.



a) State intervals of concave up.

b) State intervals of concave down.

c) Suppose there is another x-intercept off the graph to the right. State the most likely degree of this polynomial and whether the leading coefficient would be positive or negative.

12. Write a possible equation for a polynomial of given degree and given number of real zeros.

a) 6th degree with exactly 3 real distinct zeros.

b) 7th degree polynomial with exactly 5 distinct real zeros.

13. Find all Complex solutions, both real and non-real, using the QUADRATIC FORMULA. Give all real solutions rounded to the nearest hundredth and simplify all imaginary solutions.

a) $4x^2 + 20x - 1 = 0$ b) $x^2 - 4x + 29 = 0$

14. Find ALL EXACT Complex solutions, both real and non-real, using FACTORING:

a) $2x^5 - 10x^3 - 72x = 0$ b) $3x^3 - 2x^2 + 18x - 12 = 0$ c) $5x^5 - 80x = 0$

15. An object is shot into the air from the top of a 30 foot building. The following equation models the height of the object as a function of time. $h(t) = -16t^2 + 200t + 30$

a) Find the time to reach it's maximum height.

b) Find the maximum height.

c) Find the time it takes for the object to return to the ground.

d) Find the time it takes for the object to reach a height of 100 feet.

16. Find each product: a) $(2+4i)(5-3i)$ b) $(6+7i)(6-7i)$

17. Find each quotient. a) $\dfrac{3x^4 - 8x^3 + 7x^2 + 4x - 9}{x - 2}$ b) $\dfrac{8x^3 + 22x^2 - 25x + 3}{4x - 3}$

18. Use the fact 3 and –4 are zeros to find the remaining Complex roots, real and non-real, of this polynomial.
$y = x^4 + x^3 - 6x^2 + 6x - 72$

19. Is $x - 2$ a factor of $f(x) = 2x^3 + 3x^2 - 18x + 8$? Give a reason for your answer.

20. Solve each rational equation.

a) $\frac{5}{x+3} = \frac{2x}{x^2+5x+6} + \frac{7}{x+2}$

b) $\frac{2x^2-6x-18}{x^2+3x+2} + \frac{4}{x+1} = \frac{x}{x+2}$

21. Simplify.

$\frac{3x^2+18x}{x^2+5x-6} \cdot \frac{x^3-9x^2+20x}{x^2-4x-5} \div \frac{6x^2-24x}{x^2-1}$

22. Simplify.

a) $\dfrac{\frac{2}{x+3} - \frac{3}{x^2+x-6}}{\frac{5}{x-2}}$

b) $\frac{3x}{x^2+7x+12} - \frac{4}{2x^2+4x-16}$

23. Find all points of discontinuity and state if they are holes or vertical asymptotes. $y = \frac{x^2-16}{2x^3-2x^2-24x}$

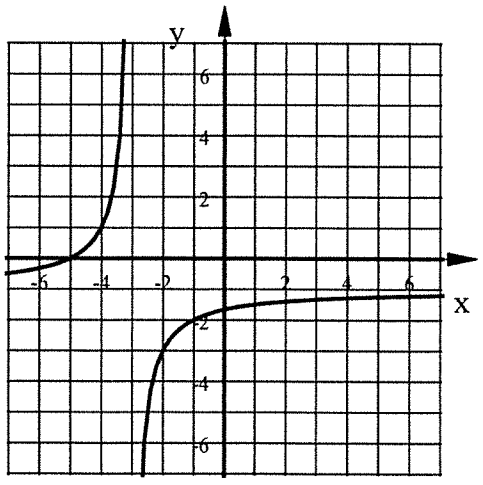
24. Write the equation of the Horizontal Asymptote of each, if any.

a) $y = \frac{6x^2+10x-3}{2x^2-5x+1}$

b) $y = \frac{14x+3}{7x^2-4x-5}$

c) $y = \frac{8x^3+9x^2-4}{2x^2+3x+4}$

25. Write the equation of this graph which is a transformation of $y = \frac{2}{x}$



Alg 2 Final Exam Review Fall 2019 **ANSWERS**

1. a) $f^{-1}(x) = \sqrt[3]{\frac{5x+3}{2}}$ b) $f^{-1}(x) = \frac{x+7}{-4}$ c) $f^{-1}(x) = \frac{\left(\frac{x+9}{4}\right)^2 - 8}{5}$ d) $f^{-1}(x) = 7 \cdot \sqrt[5]{\frac{x}{10}} - 8$

2. a) No a) Yes c) No 3. a) $f^{-1}(2) = 10$ b) $f^{-1}(3) = 22$

4. $y = -3(x+4)^2 + 10$ 5. $g(x) = -\frac{1}{2}(x+4)^2 - 7$

6. 3 times taller, moved 6 units left, and 10 units up

7. a) Abs Max: None, Abs Min: $(2.72, -6.47)$, Rel Max: $(0.66, 9.86)$, Rel Min: $(-1.12, -1.19)$
   b) Increasing: $(-1.12, 0.66) \cup (2.72, \infty)$ Decreasing: $(-\infty, -1.12) \cup (0.66, 2.72)$

8. a) Neither b) Odd c) Even

9. Rate of Change $= -9\frac{\text{ft}}{\text{min}}$ This represents the climber is moving down at a rate of 9 ft/min.

10. a) (↖,↗) b) (↖,↘) c) (↙,↗) d) (↙,↘)

11. a) $(-\infty, -2) \cup (1, 4)$ b) $(-2, 1) \cup (4, \infty)$
    c) 6th degree with a positive leading coefficient.

12. There are many possible answers. An example answer for each problem is given.
a) $y = (x+1)^2(x-2)^2(x+3)^2$ b) $y = x^3(x+1)(x-2)(x+3)(x-4)$

13. a) $x = -5.05, 0.05$ b) $x = 2 \pm 5i$

14. a) $x = 0, \pm 3, \pm 2i$ b) $x = \pm i\sqrt{6}, \frac{2}{3}$ c) $x = 0, \pm 2, \pm 2i$

15. a) 6.25 sec b) 655 ft c) 12.65 sec d) 0.36 and 12.14 sec

16. a) $22 + 14i$ b) 85 17. a) $3x^3 - 2x^2 + 3x + 10$ $R = 11$ b) $2x^2 + 7x - 1$

18. $x = \pm i\sqrt{6}$

19. Yes $x - 2$ is a factor of $f(x) = 2x^3 + 3x^2 - 18x + 8$ because the remainder is zero.

20. a) $x = -\frac{11}{4}$ b) $x = 5$ 21. $\frac{x}{2}$ 22. a) $\frac{2x-7}{5(x+3)}$ b) $\frac{6x^2 - 16x - 12}{2(x-2)(x+3)(x+4)}$

23. Points of discontinuity are $x = 0, -3, 4$ Holes: $x = 4$ VA: $x = -3, 0$

24. a) $y = 3$ b) $y = 0$ c) No HA 25. $y = \frac{-2}{x+3} - 1$