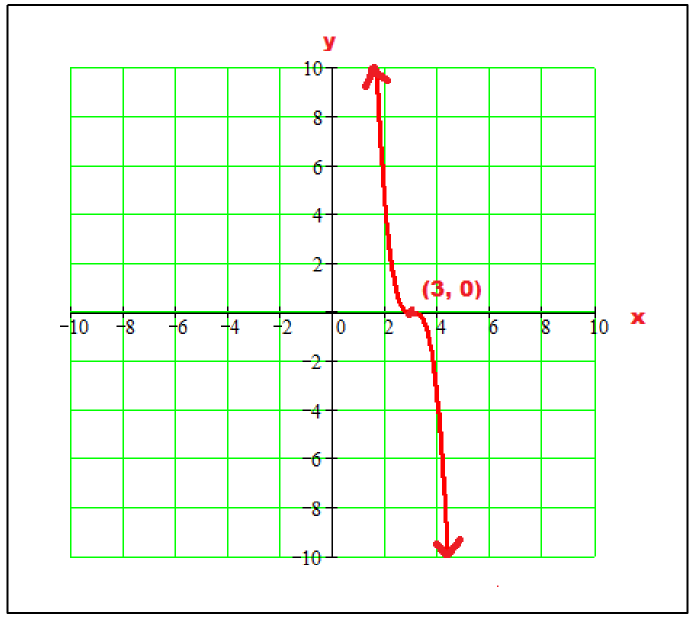
Math 3 Unit 3 Test Review

MM3A1A: Graph a Translation of a Parent Graph



1. Which equation matches the given graph?

   a. $y = -4(x-3)^3$

   b. $y = -4(x+3)^3$

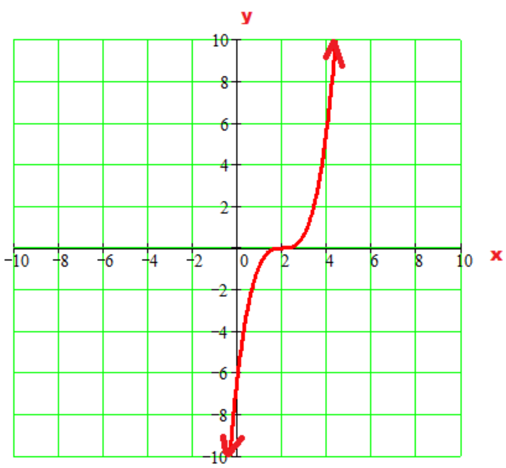
   c. $y = 4(x-3)^3$

   d. $y = -4(x)^3 + 3$

   e. $y = 4(x+3)^4$

2. Which graph shows the solution set for the polynomial function $y = f(x) = \frac{3}{4}(x-2)^4$?

a.



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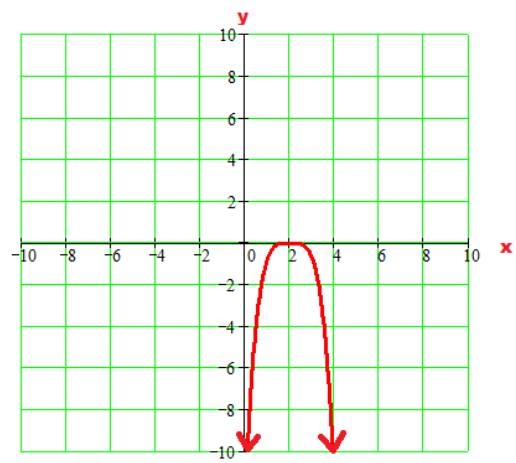

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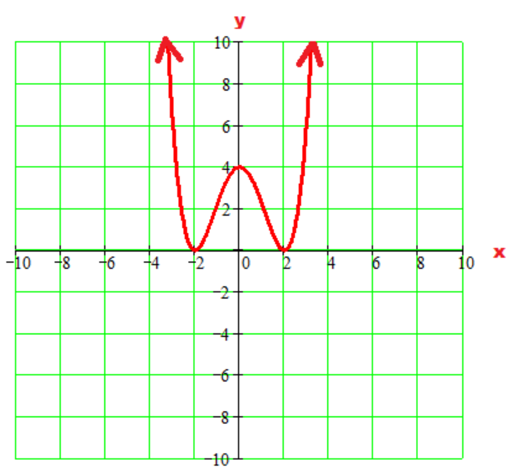

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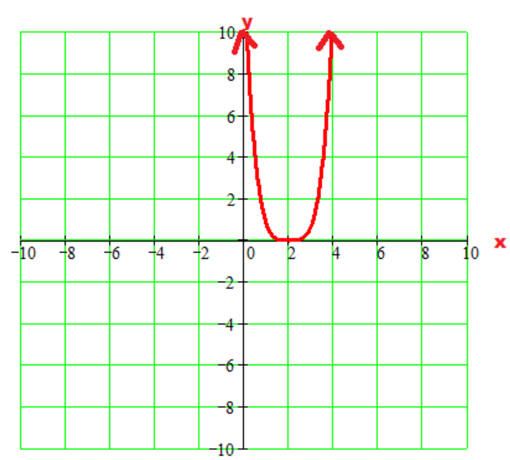
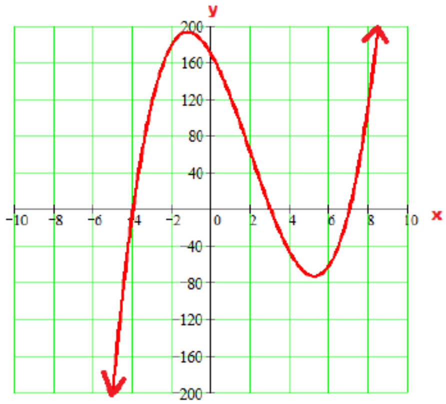


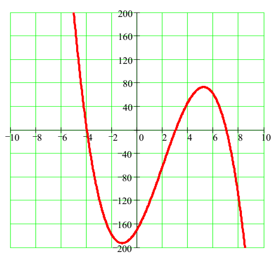
3. The inflection point of the graph of $y = 5(x-7)^3 + 10$ is at the point (____ , ____).

MM3A1B: Recognizes the effects on the graph of changing the degree, leading coefficient, or multiplicity of real zeros.

4. Jai graphed the polynomial function $y = h(x) = 2(x-3)(x+4)(x-7)$ on his calculator.



Jai decided to change the leading coefficient to -2 and change $(x+4)$ to $(x+4)^2$. What will the new graph look like?

a. 

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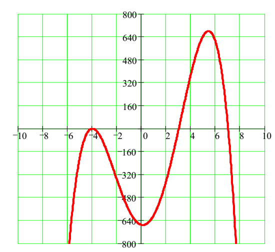
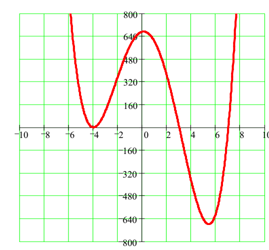
c. 

d. 

5. A group of Math 3 students examined the polynomial function $y = k(x) = 3x(x+4)^2(3x+5)(x-10)$. Which student made an <u>incorrect</u> statement?

a. Sai said there is a double root/zero at $x = -4$.

b. Sarah said the leading term would be $9x^5$ if you simplified this (by multiplying it out).

c. Corey said the zeros are $x=0$, $x=-4$, $x=\frac{-3}{5}$, and $x = 10$.

d. Sydney said the y-intercept is (0, 0).

e. Mike said this is a 4th degree polynomial function.

6. $y = 6x^2 - 7x^5 + 12x - 50$ Find the degree of this polynomial, then find the leading coefficient.

a. 2 ; 6 b. 6 ; 2 c. 5 ; -7 d. 1 ; 12 e. not given

7. Henrietta was considering the graph $y = x^3 + 5x^2 - 9x - 45$. She decided to multiply the right side by 2 and create a new function. Compare the characteristic features of the graphs. Which is **<u>not correct</u>**?

a. The x-intercepts are the same.

b. The y-intercept stays the same.

c.. The domain stays the same $(-\infty, \infty)$.

d. The range stays the same $(-\infty, \infty)$.

e. The graphs have different relative maxima and minima.

MM3A1C: Symmetry… odd, even, neither

8. Which polynomial function is an even function?

   a. $y = 2x^4 + 6x^2 + 11$ b. $y = 8x^3 + 6x^2 + 10x + 14$ c. $y = x^2 - 7x + 6$ d. $y = 5x^3 + 6x$ e. $y = x^3 + 7$

9. Which polynomial function is an odd function?

   a. $y = 2x^4 + 6x^2 + 11$ b. $y = 8x^3 + 6x^2 + 10x + 14$ c. $y = x^2 - 7x + 6$ d. $y = 5x^3 + 6x$ e. $y = x^3 + 7$

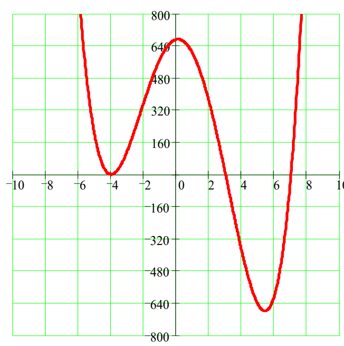
10. Which polynomial function is symmetric to the origin?

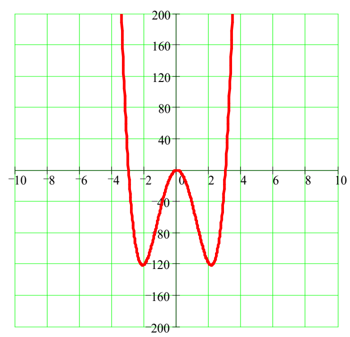
   a. $y = 2x^4 + 6x^2 + 11$ b. $y = 8x^3 + 6x^2 + 10x + 14$ c. $y = x^2 - 7x + 6$ d. $y = 5x^3 + 6x$ e. $y = x^3 + 7$

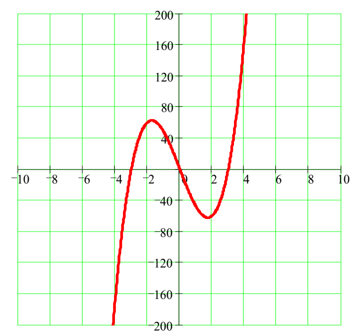
11. Which polynomial function is symmetric to the y-axis?

   a. $y = 2x^4 + 6x^2 + 11$ b. $y = 8x^3 + 6x^2 + 10x + 14$ c. $y = x^2 - 7x + 6$ d. $y = 5x^3 + 6x$ e. $y = x^3 + 7$

12. Label each of the 3 graphs as even odd or neither.



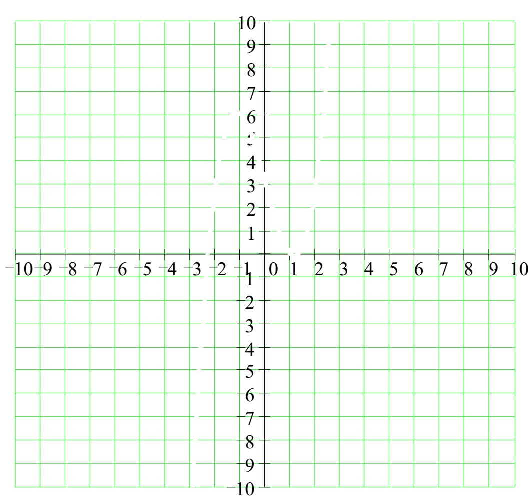




__________________ ________________ _________________

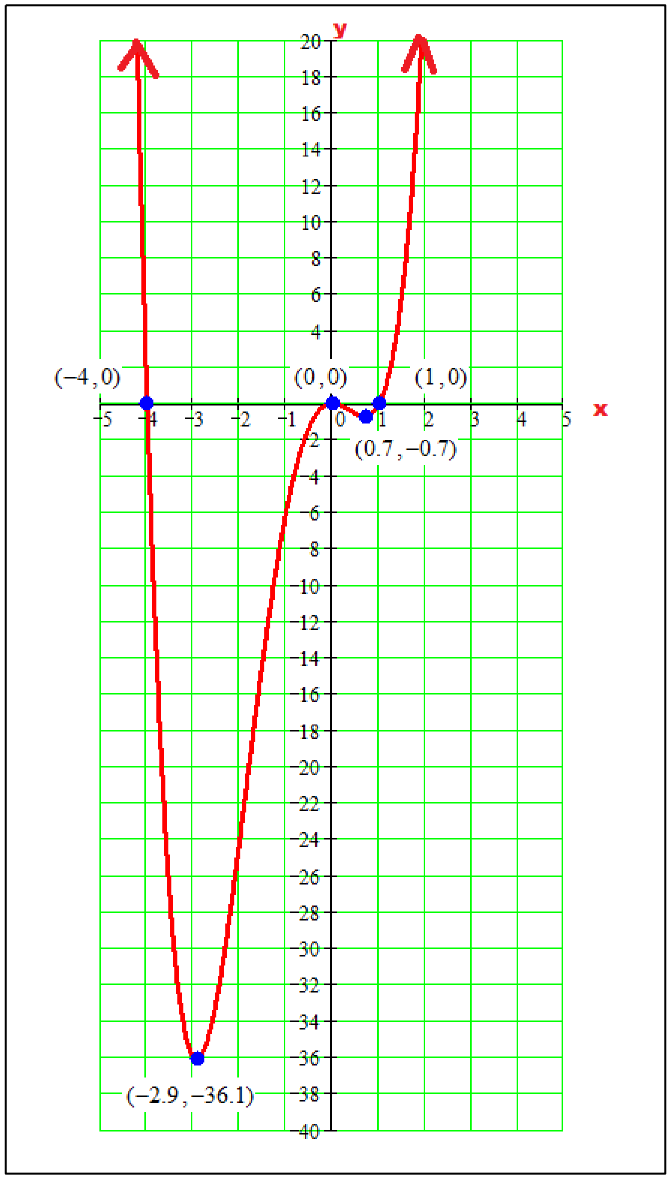
MM3A1D: Characteristics of functions domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.

13. Graph the given polynomial on your graphing calculator. Choose an appropriate window. Sketch the graph below (accurately… rel. max, rel. min, zeros, y-intercept, etc.). **$y = g(x) = x^3 - 4x + 3$**



MM3A1D: Characteristics of functions domain and range, intercepts, zeros, relative and absolute extrema, intervals of increase and decrease, and end behavior.

The year was 2013 and Mr. Idontstudy was in 11th grade for the second time! He graphed the polynomial function $y = f(x) = x^4+3x^3-4x^2$ on his new TI-100 graphing calculator. The teacher checked it and he was 100% correct. Use his graph to answer the questions. (Use graph or equation for #14-25)



14. Is there an absolute max.? ___
    Where? (____ , _____)

15. Is there a relative max.? ___
    Where? (____ , _____)

16. This function is __________
    (insert odd, even, or neither)

17. Is there an absolute min.? ___
    Where? (____ , _____)

18. Is there a relative min.? ___
    Where? (____ , _____)

19. On what interval(s) of the domain is the function increasing?

    ____

20. On what interval(s) of the domain is the function decreasing?

    ____

21. What are the zeros? ______________________

22. Use the equation to find f(-2). ________
    Check your answer on the graph.

23. According to the graph, which equation has No Real solutions? (mult. choice)
    a. f(x) = 10
    b. f(x) = 0
    c. f(x) = -24
    d. f(x) = -40

24. The range of this function is ____________.

25. The end behavior is________ (mult. choice)
    a. as x approaches ∞ then y approaches ∞, as x approaches -∞ then y approaches ∞
    b. as x approaches ∞ then y approaches -∞, as x approaches -∞ then y approaches ∞
    c. as x approaches ∞ then y approaches ∞, as x approaches -∞ then y approaches -∞
    d. as x approaches ∞ then y approaches -∞, as x approaches -∞ then y approaches -∞

MM3A3A: Find real and complex roots of higher degree polynomial equations using the factor theorem, remainder theorem, rational root theorem, and fundamental theorem of algebra, incorporating complex and radical conjugates.

26. Perform Long Division. Show all work. $\frac{2x^4 + 3x^2 + 12x - 8}{x^2 + 3x - 4} =$ ______________________

Work:

27. Perform Synthetic Division. Show all work . $\frac{2x^4 + 3x^2 + 12x - 8}{x - 5} =$ ______________________

Work:

28. If you divide ($5x^5 + 6x^3 - 12x + 50$) by (x -2) then the remainder will be _________.

29. Is (x -3) a factor of ($x^3 + 27x - 81$) ? __________ How can you tell? ________________________________

30. Is (x + 1) a factor of ($x^3 + x^2 - 9x - 9$)? __________ How can you tell? ______________________________

31. Suppose that $y = f(x) = 6x^3 - 5x^2 - 1$. We can substitute to see that f(1) = 0. This means one linear factor of f(x) is __________. If I then divide (synthetic or long division) then I can see that the other quadratic factor is ____________.

32. According to the Fundamental Theorem of Algebra, we should look for <u>how many</u> complex zeros when we examine $y = x^5 - 10x^3 + 9x$? _________

33. List the possible rational roots (zeros) of p(x) if $y = p(x) = 2x^3 + 7x^2 - 9$. { ________________________________ }

34. Use the results of #32. Find all zeros (Real, Imaginary, Complex) of $y = p(x) = 2x^3 + 7x^2 - 9$.

{ _____________, ___________ , ____________ }

Work:

35. Use the rational root theorem to quickly find the zeros and factors of $y = x^4 - 10x^2 + 9$

a. Zeros: ___________________________ b. Factors: _______________________________

36. A polynomial function k(x)with integral (Integer) coefficients has complex zeros at x = 3, x = 3 + 2i, and x = $\sqrt{5}$. The polynomial of least degree is 5th degree. The other 2 zeros are x = _____________ and x = _____________.

Bonus: List the factors and use a leading coefficient of 1 to find k(x) in simplest form. _____________________

MM3A3B,D: Solve Polynomial Equations.

37. Solve for x. $x^4 - 5x^2 = -4$ ____

38. Solve for x. $6(2x+1)(3x)(x-6)^2(x+8)^3 = 0$ ____

39. Solve for x. $x^3+3x^2+4x+3 = 0$ ____

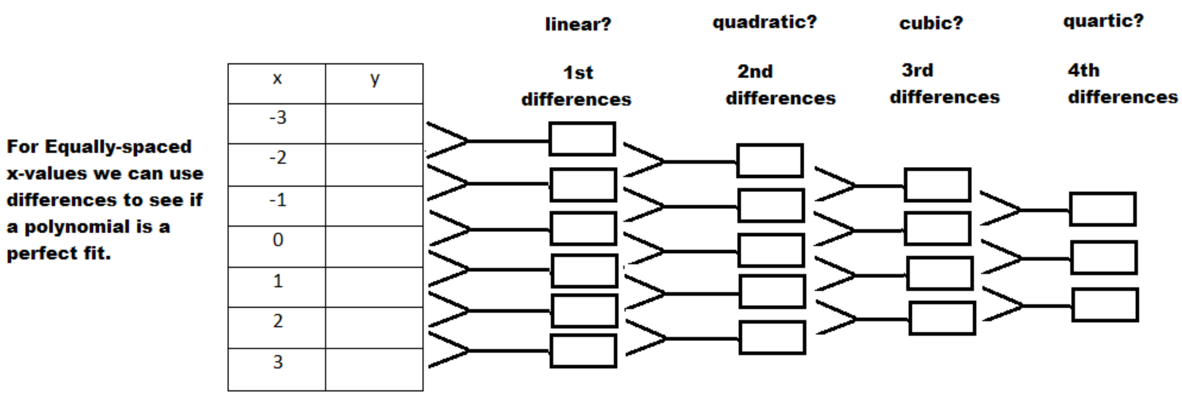
40. . Solve for x. $x^3+x^2-7x+2 = 5$ ____

41. Ms. Hajduk used a polynomial equation to generate this table.

x	-3	-2	-1	0	1	2	3
y	23	18	9	2	3	18	53

Calculate differences. The format for the polynomial of least degree that matches this table is

a. $y = ax+b$ b. $y = ax^2+bx+c$ c. $y = ax^3+bx^2+cx+d$ d. $y= ax^4+bx^3+cx^2+dx+e$

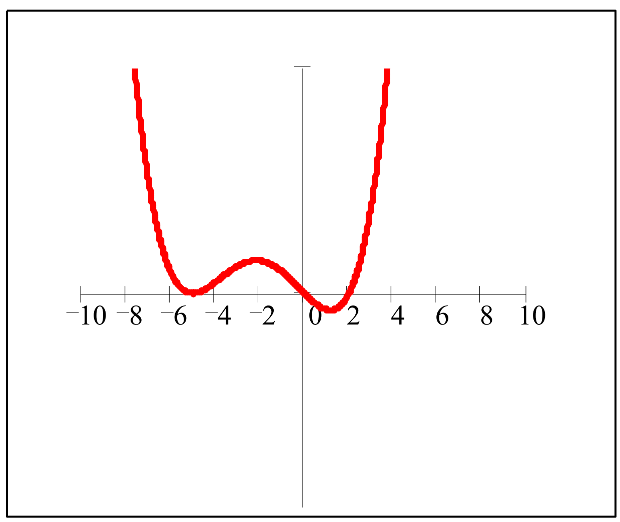


42. Refer to #41. Use a graphing calculator to find the polynomial of least degree that matches the table in #1. You may use inverse matrices or statistics, your choice.

y = ____

MM3A3C: Solve Polynomial Inequalities

43. P(x) is shown. Solve for x. Use Interval Notation.



a. $P(x) = 0$ ______________________________

b. $P(x) > 0$ ______________________________

c. $P(x) < 0$ ______________________________

d. $P(x) \geq 0$ ______________________________

e. $P(x) \leq 0$ ______________________________

44. Solve for x. $-2(x-3)(x+2)^2(3x-5) > 0$

____

45. Solve for x. $x^3 - 6x^2 - 4x + 24 \leq 0$ ____