Name:_____ Date:_____

HW Pre Calculus 12 Section 3.1 Graphing Polynomial Functions

1. What are the conditions required to be a polynomial function? Explain:

2. What is the "degree" of a polynomial? What does it tell you? Explain:

3. How do you determine the degree of a polynomial function is in "factored form" vs "general form"?
   $y = x(x-1)(x-2)(x-3)$ vs $y = x^3 - 6x^2 + 11x - 6$

4. What does it mean to find the "roots" of a polynomial function?

5. How do you find the roots of a polynomial function in factored form? ie: $y = x(x-1)(x-2)(x-3)$

6. How do you find the roots of a polynomial function in general form? Ie: $y = x^3 - 6x^2 + 11x - 6$

7. What is the leading coefficient of a polynomial function? How do you find the LC and what does it tell you?
   Ie: $y = 2x(3x-1)(4x-2)(5x-3)$ vs $y = 4x^3 + 5x^2 + 6x + 7$

8. How do you find the "y – intercept" of a polynomial function when it is in "factored form" vs "general form"?
   $y = 2x(3x-7)(4x-6)$ vs $y = 9x^4 + 8x^2 - 11x^7 + 2$

9. How many roots does the equation have? Explain: $y=\left(x^2+9\right)\left(x^2+16\right)$

10. What is the maximum number of roots that the general function have? $y=4x^7+3x^5+2x^2+10$

11. What is a "DOUBLE" Root? What does it do to a polynomial function? Explain:

12. How can you tell if a polynomial function has a Double root? Explain:
    ie: $y=(x-3)^2(x+2)$

13. What is a "Triple" Root? What does it do to a polynomial function? Explain:

14. Indicate which of the following are polynomials. Circle them and state the degree. If it is NOT a polynomial, explain why:

a) $y=\sqrt{3x^2}-2x+5$	b) $y=\sqrt{3}x^2-4x+5$	c) $y=10$	d) $y=2^x$
e) $y=(x-3)^2$	f) $y=2x$	g) $\frac{2x^2-3x+5}{10}$	h) $y=\frac{2x^2-3x+5}{2x}$
i) $y=\frac{1}{2x^2-3}$	j) $y=\sqrt{3x^4}-3x$	k) $y=(x-5)^{-1}$	L) $y=\frac{x^2-4}{x+2}$

15. Given the polynomial equations below, indicate the "Leading Coefficient", "Degree" and "Y-intercept". Indicate the maximum possible number of roots that the equation can have.

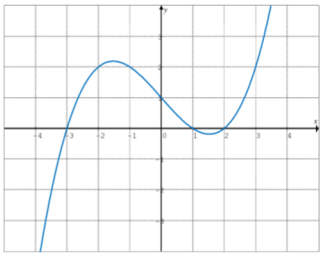
a) $y=-12x^3+7x^2-8x+6$ Degree: LC Y-intercept	b) $y=\sqrt{5}x^3+\frac{4}{7}x^2-5x+9$ Degree: LC Y-intercept

c) $y=13x^5-19x^5+17-2x$ Degree: LC Y-intercept	d) $y=\frac{9}{5}x^4-\frac{11}{2}x^5+\sqrt{6}x^3-21$ Degree: LC Y-intercept
e) $y=-12x^4+7x^3$ Degree: LC Y-intercept	f) $y=-7x^2-12x^3-20x^7-12x+1$ Degree: LC Y-intercept

16. For each equation below, find the "roots", "degree" , "leading coefficient", and "Y" intercept. Indicate if there are any "Double" or "Triple" roots in your equation.

a) $y=(x-3)(x+4)(2x-1)$ Degree: # of Roots: LC Y-intercept	b) $y=(4-x)(5-2x)^2(x-21)$ Degree: # of Roots: LC Y-intercept
c) $y=(x^2-4)(x^2-1)$ Degree: # of Roots: LC Y-intercept	d) $y=x(x-1)(x^2-9)$ Degree: # of Roots: LC Y-intercept
e) $y=2x^2(x^2+4)(x^2+16)$ Degree: # of Roots: LC Y-intercept	f) $y=(x^2-2x-63)(x^2+2x-35)$ Degree: # of Roots: LC Y-intercept
g) $y=(x^2+3x-28)(x^2+20x+99)$ Degree: # of Roots: LC Y-intercept	h) $y=4x^2(x^3+3x^2+3x+1)$ Degree: # of Roots: LC Y-intercept

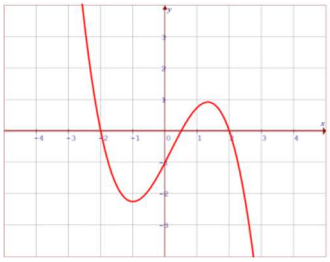
17. State the roots, y-intercepts, domain, range, and the equation in factored form.



Roots: Degree:

Equation in Factored Form:

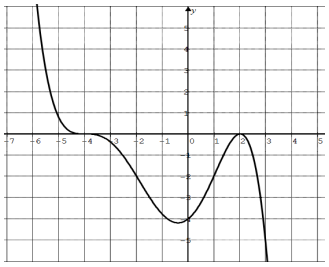
ii)



Roots: Degree:

Equation in Factored Form

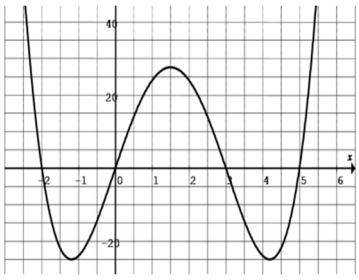
iii)



Roots: Degree:

Equation in Factored Form

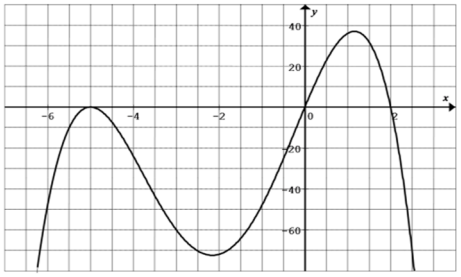
iv)



Roots: Degree:

Equation in Factored Form:

d)

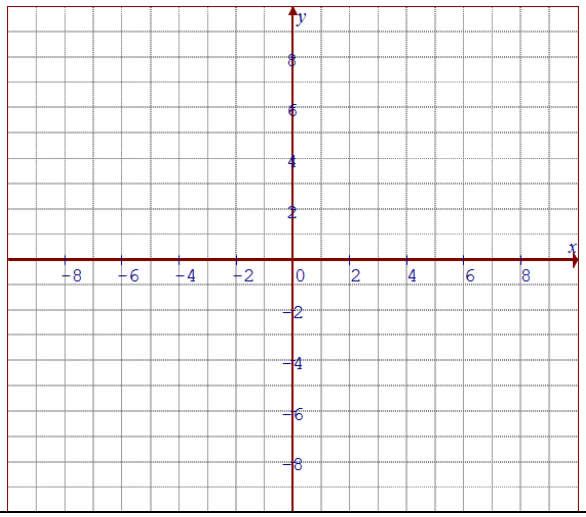


Roots: Degree:

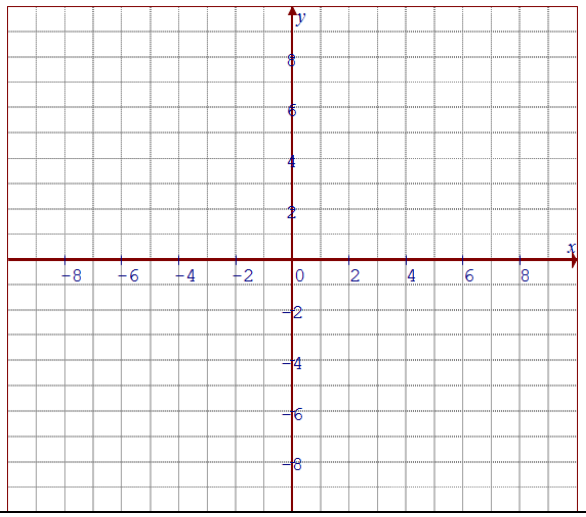
Equation in Factored Form:

18. Given each of the following equations in factored form, graph it on the grid provided.

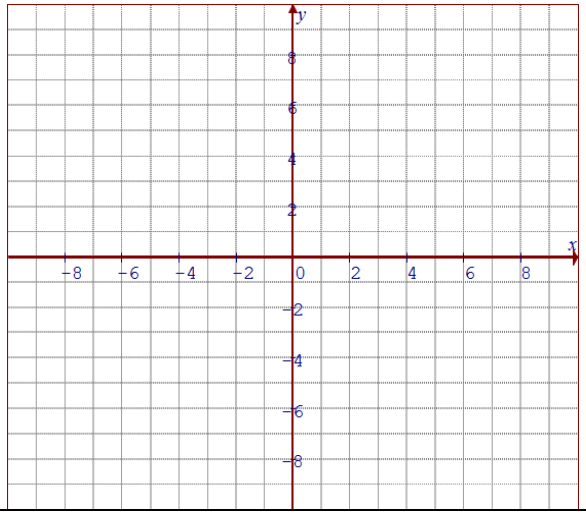
a) $y = -\frac{1}{6}(x-2)(x+1)(x+3)$



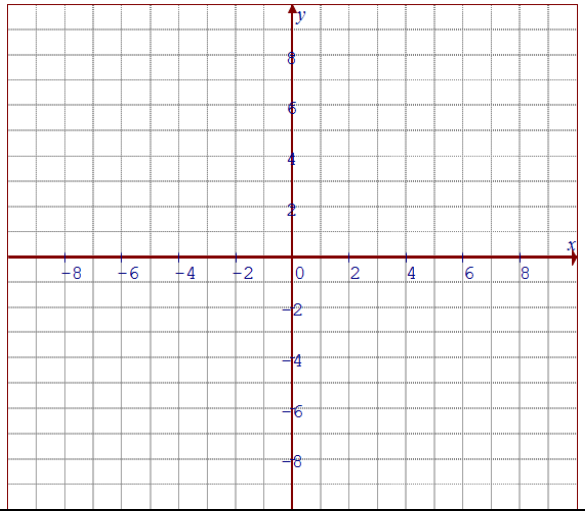
b) $y = \frac{1}{2}(x+3)(2x-1)(2x+1)$



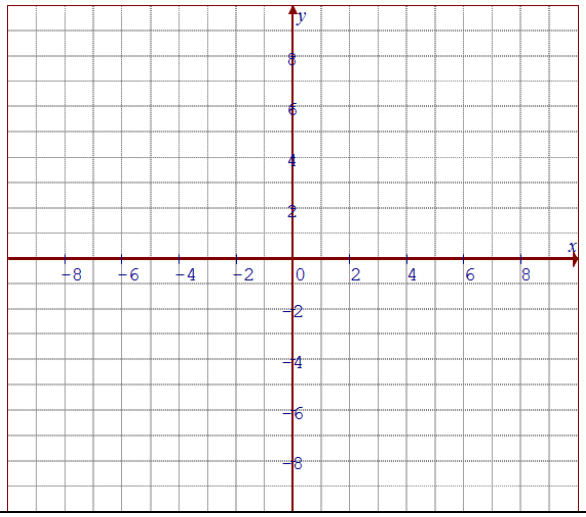
c) $y = 0.5x\left(x^2 - 1\right)$



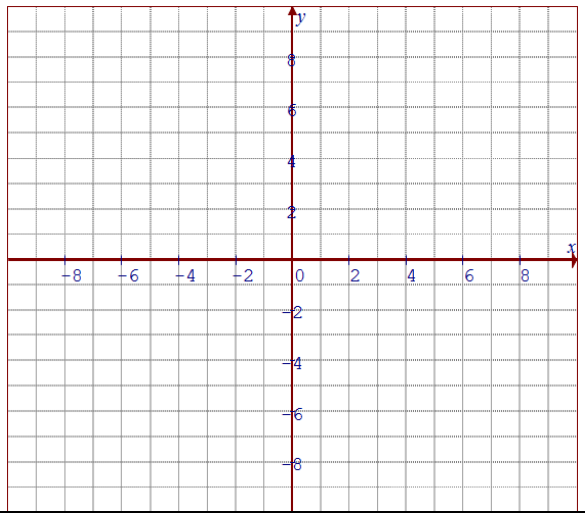
d) $y = -\frac{1}{8}(x-1)^3(x+2)$



e) $y = \frac{-1}{81}(x+1)(x)(x-2)(x-3)$



f) $y = \frac{1}{16}(2x-3)(4x+1)(x-2)^2$



19. A polynomial has roots at 1, 2, and -5. It has crosses the point (0, 8) on the Yaxis. What is the equation of the polynomial?

20. A polynomial has roots at -3, 4, and a double root at 2/3. It crosses the point (2,2). What is the equation of the polynomial?

21. Indicate whether of the following statements are either true of false

a. The domain of all polynomial functions is all real numbers TRUE / FALSE

b. The range of all polynomial functions is all real numbers TRUE / FALSE

c. The range of $y = Ax^2 - Bx^3 + C \quad (A, B, C \neq 0)$ is all real numbers TRUE / FALSE

d. The degree of the following polynomial function is 5

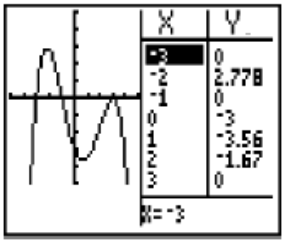
i. $y = x\left(x^2 - 1\right)\left(x^2 + 1\right)$ TRUE / FALSE

ii. $y = x\left(2x^2 - 3x + 6x^3 + 3x\right)$ TRUE / FALSE

iii. $y = (2x - 4)\left(2x^3 - 4x + 4x^2\right)(4x - x)$ TRUE / FALSE

iv. $y = (2x - 4)\left(3 - 3x - 2x^2\right)(3x - 3x)(5x - 7x)$ TRUE / FALSE

22. Given the table of values and graph below, find the equation of the polynomial in factored form:



23. A polynomial function has the following table of values. Find the equation of the polynomial using finite difference

x	–4	–3	–2	–1	0	1	2
y	–21	30.5	35	22.5	11	6.5	3