Name:_____________________________ Date:___________________________

Math 12 Enriched: HW Section 3.1 Graphing Polynomial Functions

1. Indicate which of the following are polynomials. Circle them and state the degree:

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) $\dfrac{2x^2-3x+5}{10}$	h) $y=\dfrac{2x^2-3x+5}{2x}$
i) $y=\dfrac{1}{2x^2-3}$	j) $y=\sqrt{3x^4}-3x$	k) $y=(x-5)^{-1}$	L) $y=\dfrac{x^2-4}{x+2}$

2. Indicate the degree and the number of roots for the following equations:

a) $y=(x-3)(x+4)(2x-1)$ Degree: # of Roots:	b) $y=(x^2-4)(x^2-1)$ Degree: # of Roots:	c) $y=-x(x^2-3)(x^2+1)$ Degree: # of Roots:
d) $y=(x^2+1)(x^4+9)$ Degree: # of Roots:	e) $y=x^4+4x^3+6x^2+4x+1$ Degree: # of Roots:	f) $y=x^3+2x^2-5x-6$ Degree: # of Roots:

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

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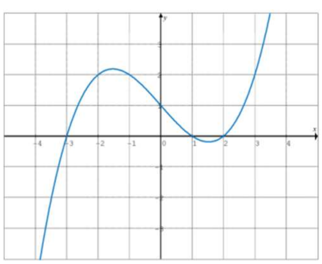
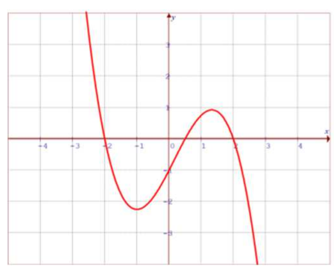


Roots: Degree:

Equation in Factored Form:

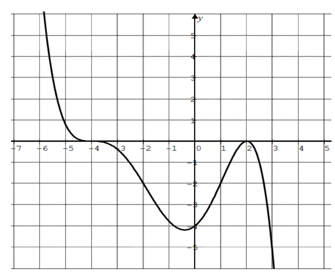
ii)



Roots: Degree:

Equation in Factored Form

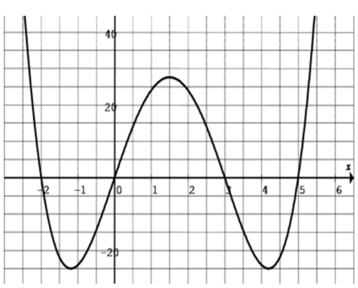
iii)



Roots: Degree:

Equation in Factored Form

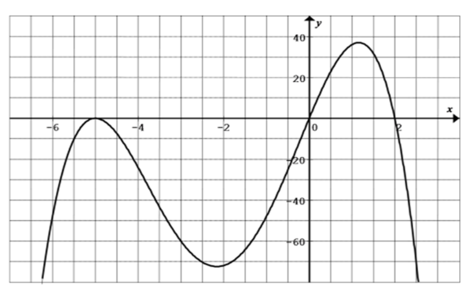
iv)



Roots: Degree:

Equation in Factored Form:

d)

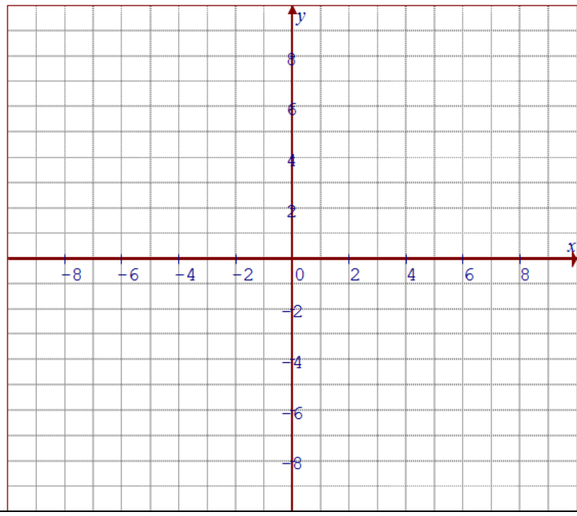


Roots: Degree:

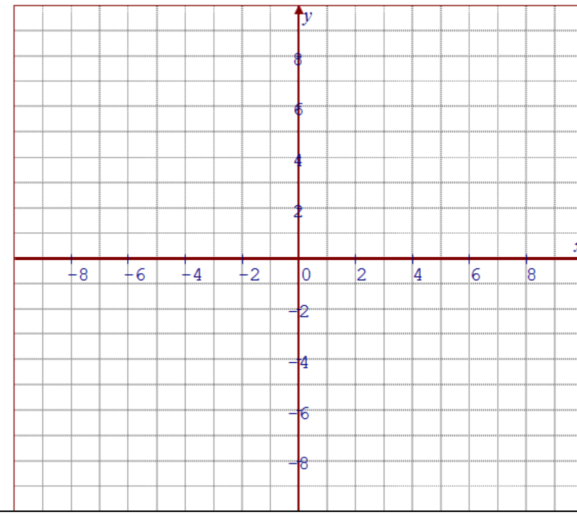
Equation in Factored Form:

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

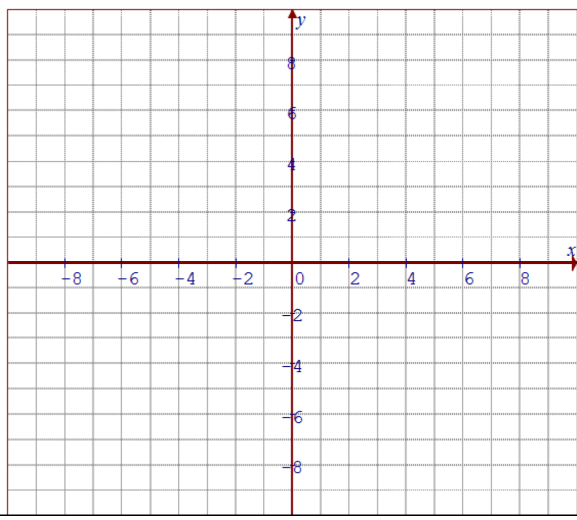
a) $y=-\frac{1}{6}(x-2)(2x+3)^2$



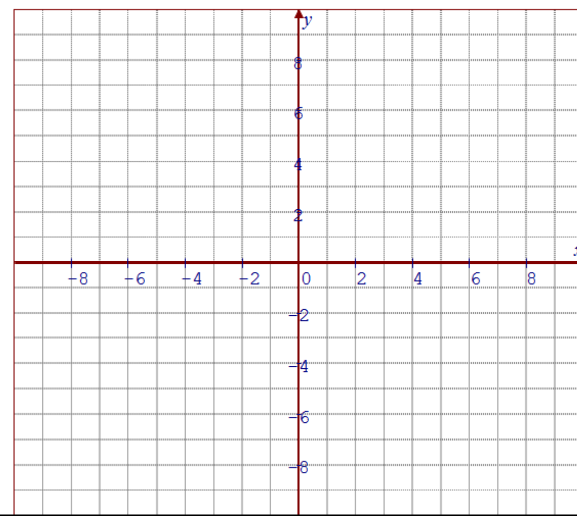
b) $y=\frac{1}{2}(x-2)(x+3)(2x+1)^2$



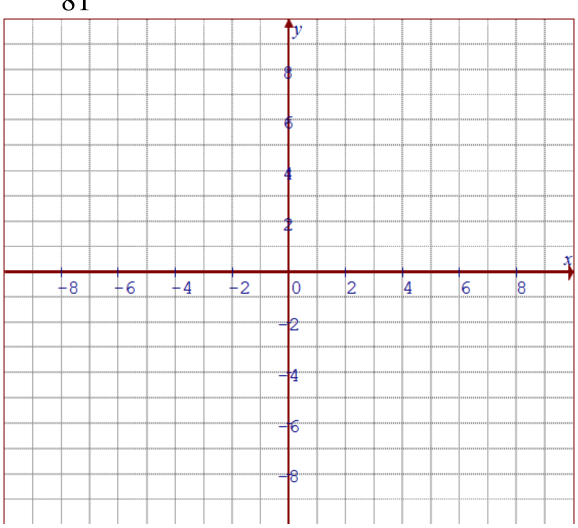
$y=(x^2-1)(x^2-4)$



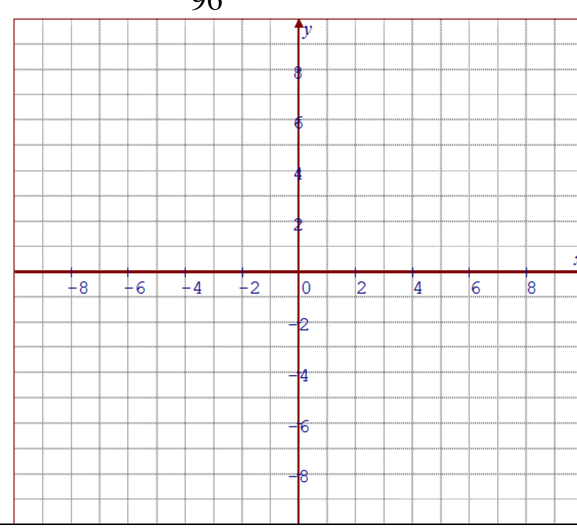
$y=(4x^2-4x-15)(0.1x+0.4)$



$y=\frac{-1}{81}(x^2-6x+9)(2x+3)^3$



$y=\frac{(x^2+8x+16)(x-3)^3}{96}$



5. Indicate whether of the following statements are either true of false
   a. The domain of all polynomial functions is all real numbers TRUE / FALSE

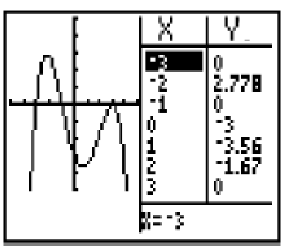
   b. The range of all polynomial functions is all real numbers TRUE / FALSE

   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. $y = x(x^2 - 1)(x^2 + 1)$ TRUE / FALSE
      ii. $y = x(2x^2 - 3x + 6x^3 + 3x)$ TRUE / FALSE
      iii. $y = (2x - 4)(2x^3 - 4x + 4x^2)(4x - x)$ TRUE / FALSE
      iv. $y = (2x - 4)(3 - 3x - 2x^2)(3x - 3x)(5x - 7x)$ TRUE / FALSE

6. The polynomial $P(x) = x^3 + ax^2 + bx + c$ has the property that the mean of its zeros, the product of its zeros, and the sum of its coefficients are all equal. If the y-intercept of the graph of $y = P(x)$ is 2, what is the value of “b”?

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



8. 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

9. If $y = x^4 + kx^2 + 4$ has 2 pairs of repeated roots only, find all the possible values of "k".

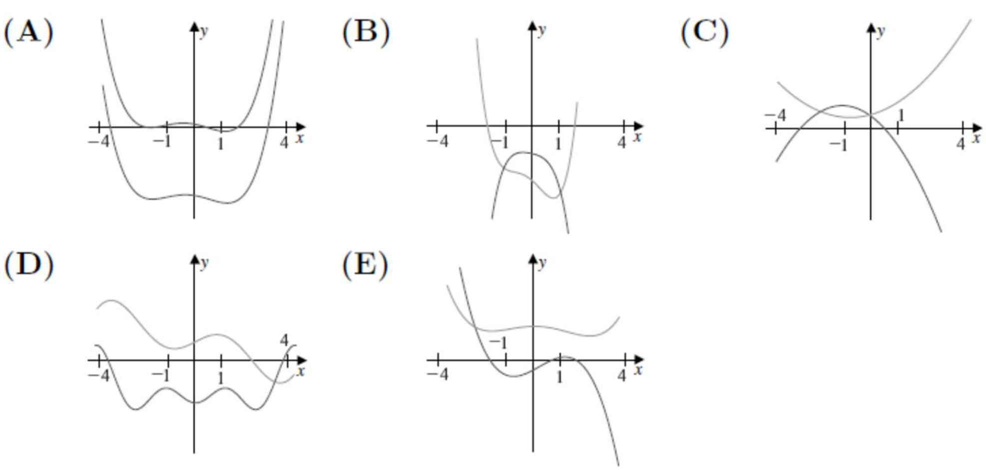
10. Both equations $x^3 - 12x + 16 = 0$ and $x^3 - 12x - 16 = 0$ have a double root and one other root that is different from the double root. Use this information to determine which of the equations below have either i) 3 different roots OR ii) only ONE root.

a) $x^3 - 12x + 20 = 0$ b) $x^3 - 12x + 10 = 0$ c) $x^3 - 12x - 20 = 0$

11. Determine the values of "k" for which the equation $x^3 - 12x + k = 0$ will have:
i) 3 different roots ii) 2 different roots iii) only one root

12. The graph of the polynomial $P(x) = x^5 + ax^4 + bx^3 + cx^2 + dx + e$ has five distinct x-intercepts, one of which is at (0,0). Which of the following coefficients cannot be zero? a? b? c? d? e?

13. Challenge: The nonzero coefficients of the polynomial P(x) with real coefficient are all replaced by their mean to form another polynomial Q(x). Which of the following graphs below can be the functions $y = P(x)$ and $y = Q(x)$ over the interval $-4 \le x \le 4$?amc12 2002 #25



If $p(x)$ is a cubic polynomial with $p(1) = 1, p(2) = 2, p(3) = 3, p(4) = 5$, find $p(6)$.

(1977 AHSME #21) For how many values of the coefficient a do the equations have a common real solution?

$$0 = x^2 + ax + 1 \text{ and } 0 = x^2 - x - a$$

