College Review Math
Section 2C & 2D Review

Name KEY

Name the roots (zeros) for each equation.

1) $y = (x – 4)(x + 9)(x + 15)$

roots: x = 4, -9, -15

2) $y = x^3(x – 1)^2(3x – 4)$

roots: x = 0, 1, 4/3

3) $y = 2x^3 – 2x^2 – 12x$

$y = 2x(x^2 – x – 6)$
$y = 2x(x + 2)(x – 3)$

roots: x = 0, -2, 3

Tell *how many* of each type of root each function contains (single, double, triple).

4) $f(x) = x^2(x – 11)(x – 1)^2(x – 4)^3$

single: 1
double: 2
triple: 1

5) $g(x) = 4x^3 – 12x^2 + 9x$

$g(x) = x(4x^2 – 12x + 9)$
$g(x) = x(2x – 3)(2x – 3)$

single: 1
double: 1
triple: 0

Use sign analysis to determine if the graph is ***above or below*** the x-axis for the function at the x-coordinate given. There is no need to sketch the graph, just test the number.

6) $y = (x + 7)(x – 11)(x + 2)$

@ x = 0 below

$y = (0 + 7)(0 – 11)(0 + 2)$
$= (+)(–)(+) = (–)$

7) $y = x^4(x – 2)^3(x + 2)$

@ x = -1 below

$y = (-1)^4(-1 – 2)^3(-1 + 2)$
$= (+)(–)(+) = (–)$

8) $y = –x(3 – x)(x + 9)^2(x – 4)^3$

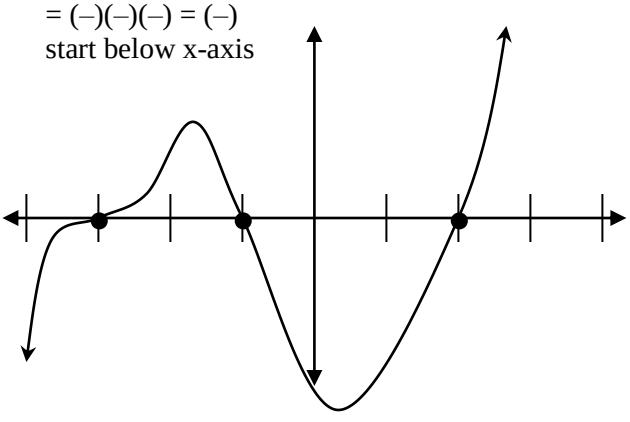
@ x = 5 above

$y = –(5)(3 – 5)(5 + 9)^2(5 – 4)^3$
$= (–)(–)(+)(+) = (+)$

Sketch the graph for the polynomial equation given. The height of the graph does not need to be accurate.

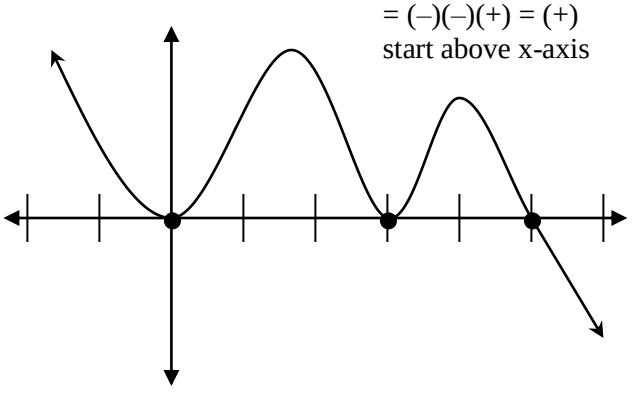
9) $y = (x – 2)(x + 3)^3(x + 1)$

Test (-4): $(-4 – 2)(-4 + 3)^3(-4 + 1)$
$= (–)(–)(–) = (–)$
start below x-axis



10) $y = -x^2(x – 5)(x – 3)^2$

Test (-1): $–(-1)^2(-1 – 5)(-1 – 3)^2$
$= (–)(–)(+) = (+)$
start above x-axis

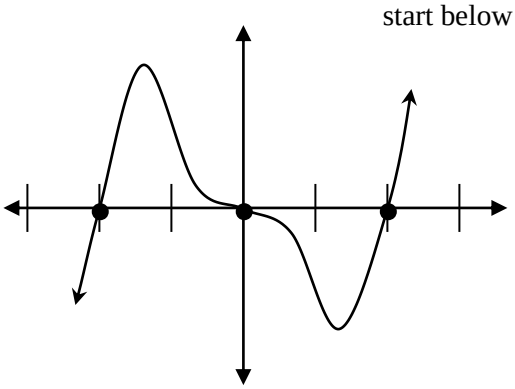


Sketch the graph for the polynomial equation given. The height of the graph does not need to be accurate.

11) $y = 2x^5 - 8x^3$

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

Test(-3): $2(-3)^3(-3 - 2)(-3 + 2)$
$= (+)(-)(-)(-) = (-)$
start below x-axis

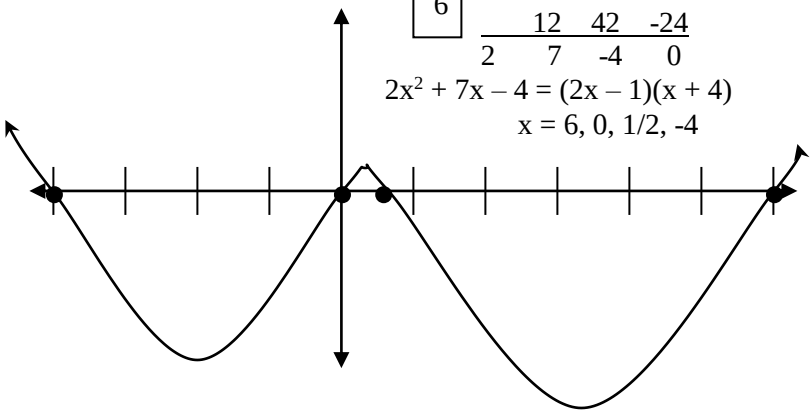


12) $y = 2x^4 - 5x^3 - 46x^2 + 24x$
(hint: x = 6 is one of the roots)

$y = x(2x^3 - 5x^2 - 46x + 24)$

6	2	-5	-46	24
		12	42	-24
	2	7	-4	0

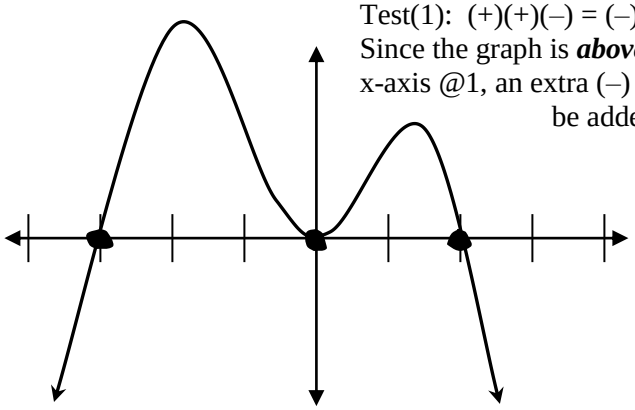
$2x^2 + 7x - 4 = (2x - 1)(x + 4)$
$x = 6, 0, 1/2, -4$



Write an equation for each polynomial graph.

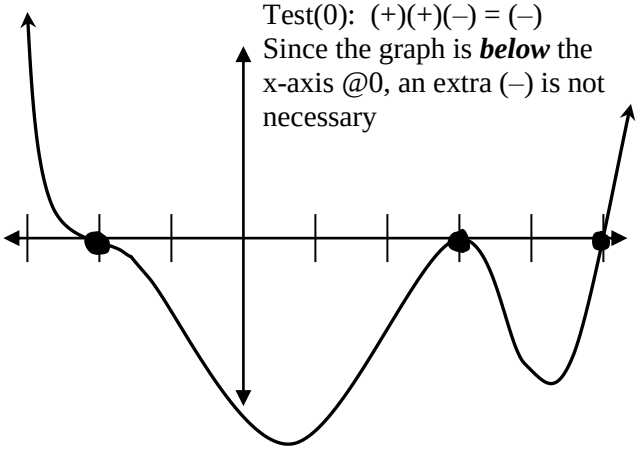
13) $y = \underline{-x^2(x + 3)(x - 2)}$

Test(1): (+)(+)(–) = (–)
Since the graph is ***above*** the x-axis @1, an extra (–) must be added



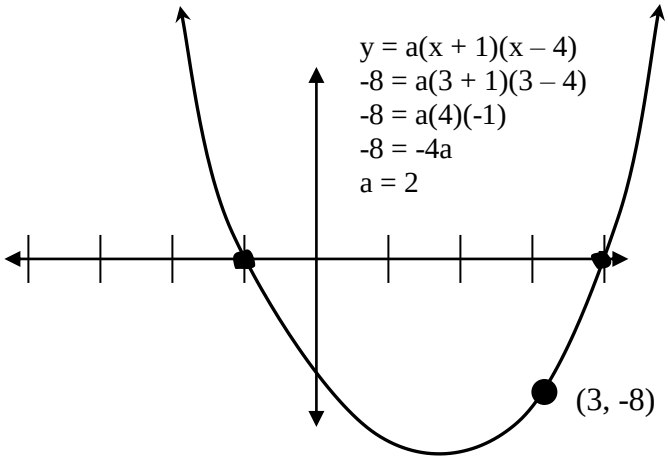
14) $y = \underline{(x + 2)^3(x - 3)^2(x - 5)}$

Test(0): (+)(+)(–) = (–)
Since the graph is ***below*** the x-axis @0, an extra (–) is not necessary



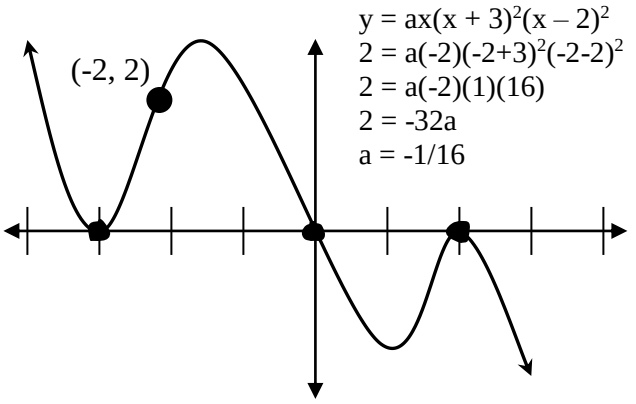
15) $y = \underline{2(x + 1)(x - 4)}$

$y = a(x + 1)(x - 4)$
$-8 = a(3 + 1)(3 - 4)$
$-8 = a(4)(-1)$
$-8 = -4a$
$a = 2$



16) $y = \underline{-1/16x(x + 3)^2(x - 2)^2}$

$y = ax(x + 3)^2(x - 2)^2$
$2 = a(-2)(-2+3)^2(-2-2)^2$
$2 = a(-2)(1)(16)$
$2 = -32a$
$a = -1/16$



Determine if each quadratic equation has a maximum or minimum, then find the value of x where it occurs.

17) $y = -3x^2 - 24x + 7$

max or min: max

x = -4

$$x = \frac{-(-24)}{2(-3)} = \frac{24}{-6} = -4$$

18) $y = (x + 5)(x - 3)$

max or min: min

x = -1

$y = x^2 - 3x + 5x - 15$
$y = x^2 + 2x - 15$

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

19) $y = 5x^2 - 7x - 1$

max or min: min

x = 7/10

$$x = \frac{-(-7)}{2(5)} = \frac{7}{10}$$

If you have a graphing calculator, find the following values (both x & y-coordinates). Round to tenths.

20) $y = x^3 + 2x^2 - 5$

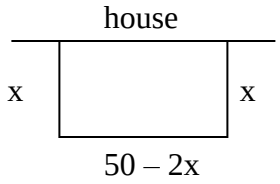
find the local maximum: (-1.3, -3.5)

21) $y = 10 + 9x - 5x^2 - 2x^3$

find the local minimum: (-2.3, -12.8)

Solve the word problems. You must write a quadratic equation that represents the information.

22) Gerry Greenthumb plants a giant rectangular garden along the back side of his house. If Gerry uses the house as one side, and 50 feet of fence to pen in the other three sides, what is the width that will give him the maximum area?



A = length X width
$A = (50 - 2x)x$
$A = -2x^2 + 50x$

$$x = \frac{-50}{2(-2)} = \frac{-50}{-4} = 12.5$$

x = width = 12.5 feet

23) The sum of two numbers is 34. Which two numbers that satisfy that condition would give you the maximum product? What would the maximum product be?

1st number	2nd number	Product
x	34 – x	$x(34 - x) = -x^2 + 34x$

$$x = \frac{-34}{2(-1)} = \frac{-34}{-2} = 17$$

x = 1st number = 17
2nd number = 34 – 17 = 17
product of the two numbers = (17)(17) = 289