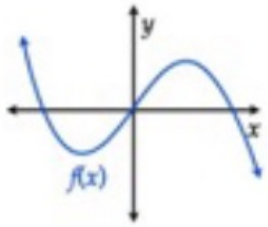
Math III Study Guide Unit 2

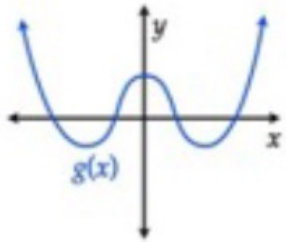
Skills and Vocabulary

Circle the correct attribute that could model a function given



The leading coefficient must be:
POSITIVE or **NEGATIVE**

The degree must be:
EVEN or **ODD**



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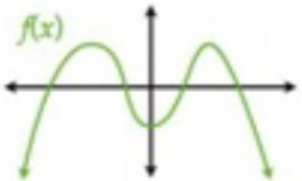

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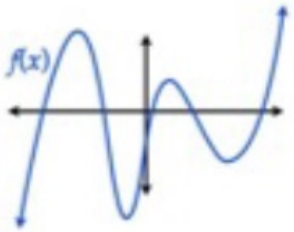
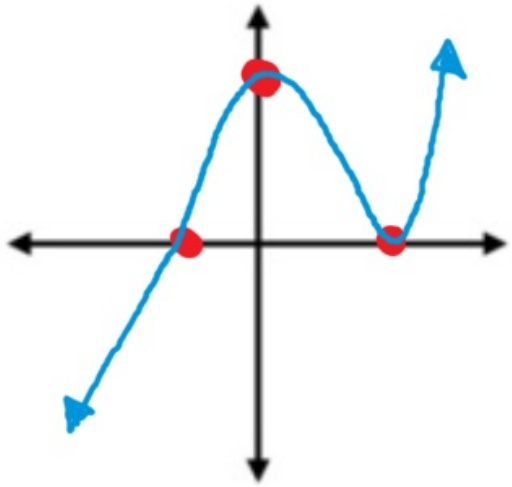


The leading coefficient must be:
POSITIVE or **NEGATIVE**

The degree must be:
EVEN or **ODD**

Sketch a possible polynomial with all integer coefficients given the attributes listed

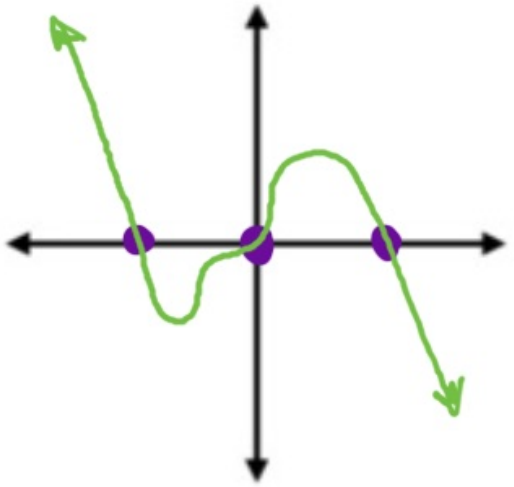


The polynomial the following ***zeros***
x = 3; multiplicity 2
x = -2

The polynomial also has a ***positive y-intercept***

$(x-3)(x-3)(x+2)$

x^3



The polynomial the following ***zeros***
x = 0; multiplicity 3

$x = \sqrt{10}$ $x = -\sqrt{10}$

The polynomial also has a ***negative leading coefficient.***

$-(x)^3(x-\sqrt{10})(x+\sqrt{10})$

$x^3 \cdot x^2$

x^5

Math III

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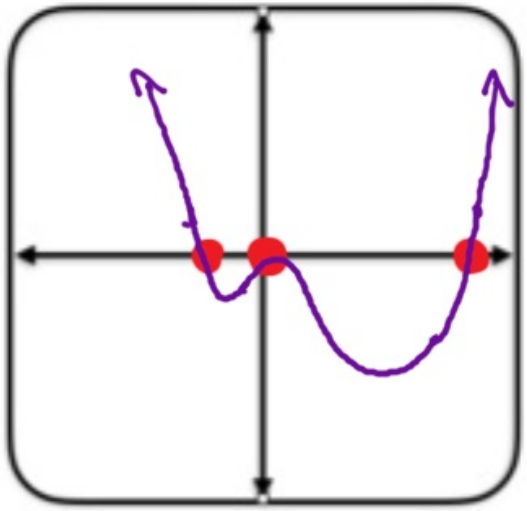
$y = x^4 - 6x^3 - 7x^2$

$x^2(x^2 - 6x - 7)$



The ***zeros*** are:

$x = 0$ mult 2 $\quad x = 7 \quad x = -1$

The ***x-intercepts*** are:

$(0,0) \quad (7,0) \quad (-1,0)$

*The ***y-intercept*** of the polynomial is: $(0,0)$

*The ***end behavior*** of the polynomial is

if $x \to \infty$ then $y \to \infty$

if $x \to -\infty$ then $y \to \infty$

-7, -7, 1, -6

$x^2(x-7)(x+1)$

$x^2 = 0$ $\quad x - 7 = 0$ $\quad x + 1 = 0$

$+7 \quad +7 \quad -1 \quad -1$

$x = 0$ mult 2 $\quad x = 7 \quad x = -1$

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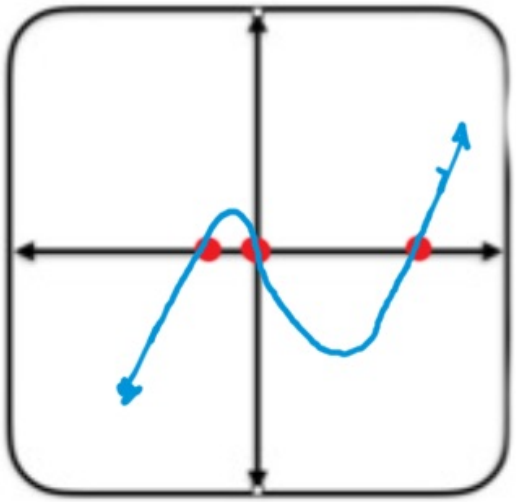
$y = 4x^3 - 17x^2 - 15x$

$x(4x^2 - 17x - 15)$



The ***zeros*** are:

$x = 0 \qquad x = 5 \qquad x = -.75$

The ***x-intercepts*** are:

$(0,0) \qquad (5,0) \qquad (-.75, 0)$

* The ***y-intercept*** of the polynomial is: $(0,0)$

* The ***end behavior*** of the polynomial is

if $x \to \infty$ then $y \to \infty$

if $x \to -\infty$ then $y \to -\infty$

$x(x^2 - 17x - 60) \rightarrow x(x - \frac{20}{4})(x + \frac{3}{4})$

-60

$-20 \quad 3$

-17

$x(x - 5)(4x + 3)$

$x = 0 \qquad x = 5 \qquad x = -.75$

$4x + 3 = 0$

$-3 \quad -3$

$\frac{4x}{4} = \frac{-3}{4}$

$x = -.75$

$y = 2x^5 - 50x^3$

The ***zeros*** are:

$x = 0$ mult 3 $\quad x = -5 \quad x = 5$

The ***x-intercepts*** are:

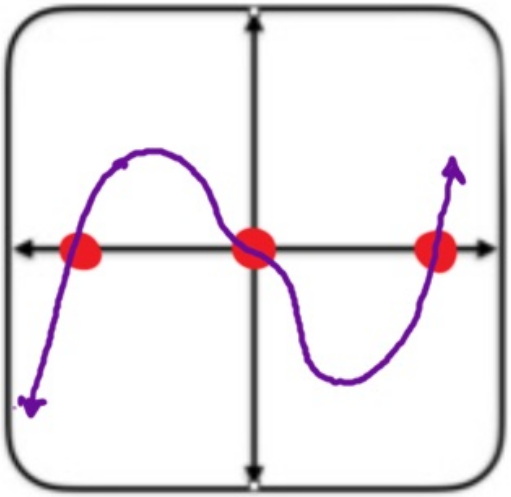
$(0,0) \quad (-5,0) \quad (5,0)$

The ***y-intercept*** of the polynomial is: $(0,0)$

The ***end behavior*** of the polynomial is

if $x \to \infty$ then $y \to \infty$

if $x \to -\infty$ then $y \to -\infty$



$2x^3(x^2 - 25)$

$(x)^2 - (5)^2$

$2x^3(x+5)(x-5)$

$\frac{2x^3}{2} = \frac{0}{2}$

$x^3 = 0$

$x = 0$ mult 3

$x + 5 = 0$

$-5 \quad -5$

$x = -5$

$x - 5 = 0$

$x = 5$

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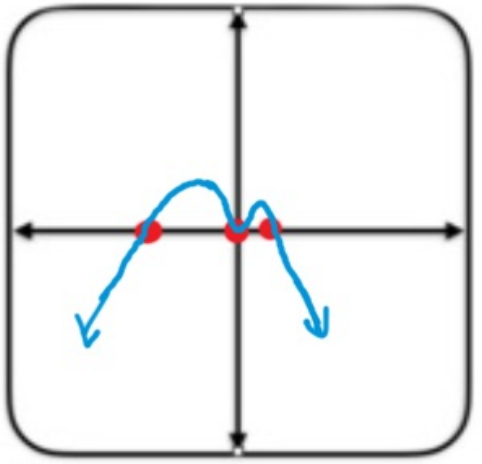
$$y = -2x^4 - 3x^3 + 4x^2$$



The ***zeros*** are:

$x = -2.35 \quad x = .85 \quad x = 0$ mult 2

The ***x-intercepts*** are:

$(-2.35, 0) \quad (.85, 0) \quad (0, 0)$

The ***y-intercept*** of the polynomial is: $(0, 0)$

The ***end behavior*** of the polynomial is

if $x \to \infty$ then $y \to$ _____

if $x \to -\infty$ then $y \to$ _____

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

A B C

$x = 0$ mult 2

$$\frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(-2)(4)}}{2(-2)}$$

$$\frac{3 \pm \sqrt{9 + 32}}{-4} \rightarrow \frac{3 \pm \sqrt{41}}{-4}$$

$\frac{3 + \sqrt{41}}{-4} \approx -2.35$

$\frac{3 - \sqrt{41}}{-4} \approx .85$

The following polynomials are in FACTORED FORM. Answer the questions and sketch a reasonable graph

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

The ***zeros*** are:

$x = 2.5$ $x = -7$ mult 4

The ***x-intercepts*** are:

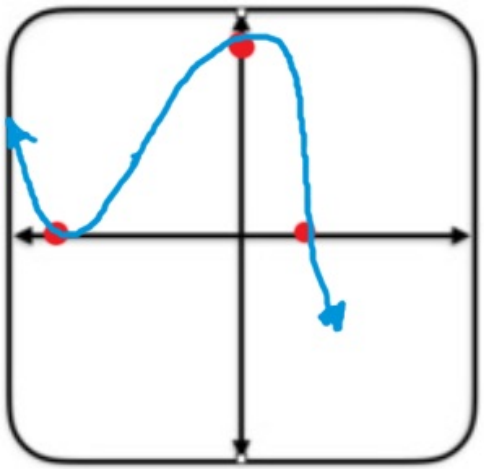
$(2.5, 0)$ $(-7, 0)$

The ***y-intercept*** of the polynomial is: $(0, 12005)$

The ***end behavior*** of the polynomial is

if $x \to \infty$ then $y \to$ _____

if $x \to -\infty$ then $y \to$ _____



$y = x^3(2x-5)(x+5)^2$ $x^3 \cdot x^1 \cdot x^2$ x^6

The ***zeros*** are:

$x = 0$ mult 3 $x = 2.5$ $x = -5$ mult 2

The ***x-intercepts*** are:

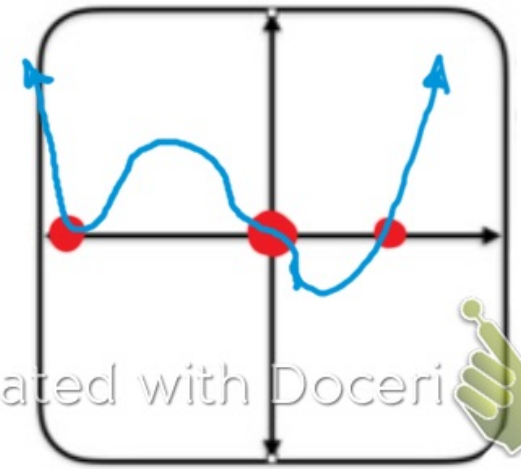
$(0, 0)$ $(2.5, 0)$ $(-5, 0)$

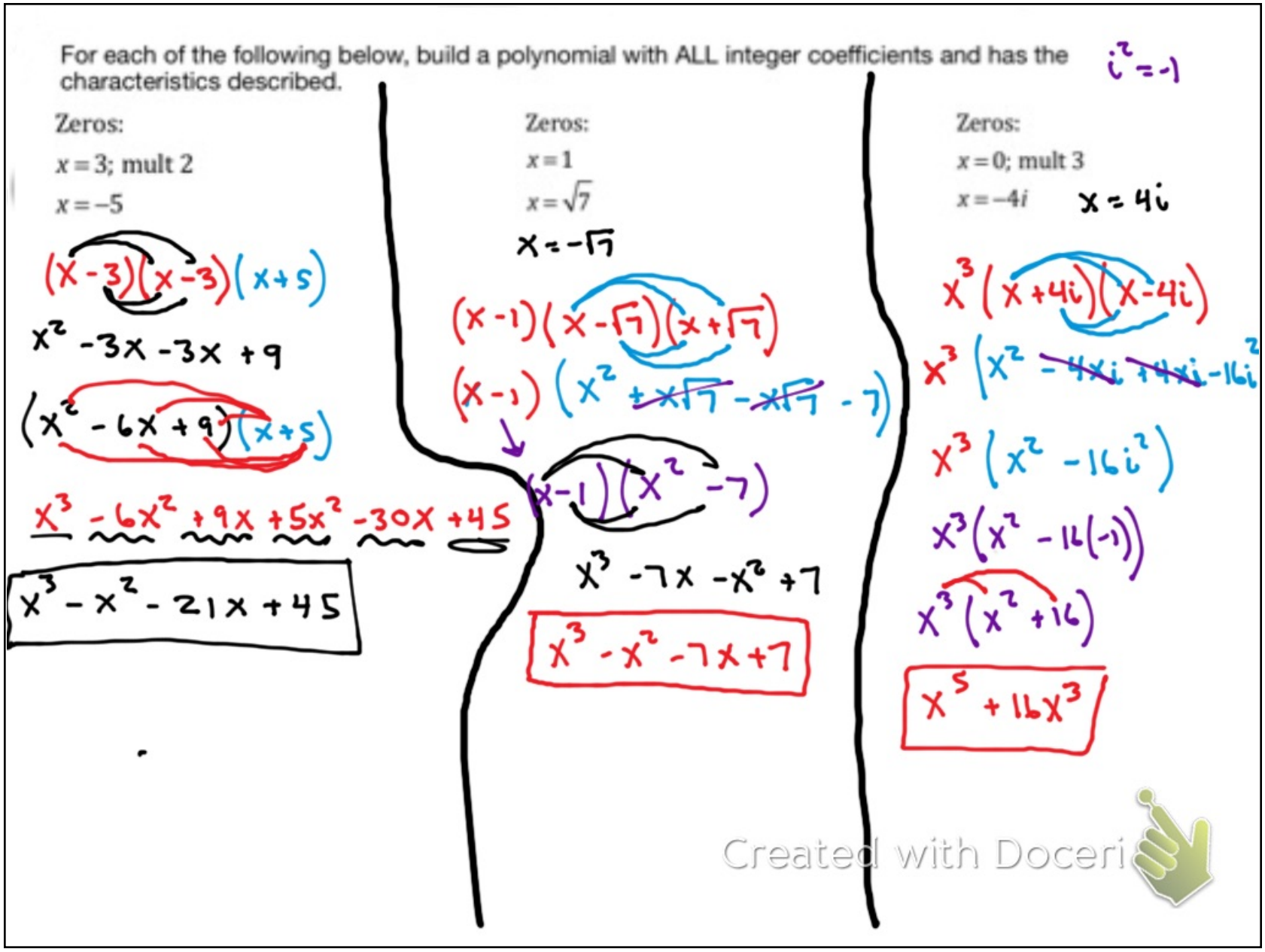
The ***y-intercept*** of the polynomial is: $(0, 0)$

The ***end behavior*** of the polynomial is

if $x \to \infty$ then $y \to$ _____

if $x \to -\infty$ then $y \to$ _____




For each of the following below, build a polynomial with ALL integer coefficients and has the characteristics described.
$i^2 = -1$
Zeros:
$x = 3$; mult 2
$x = -5$
$(x-3)(x-3)(x+5)$
$x^2 - 3x - 3x + 9$
$(x^2 - 6x + 9)(x+5)$
$x^3 - 6x^2 + 9x + 5x^2 - 30x + 45$
$x^3 - x^2 - 21x + 45$
Zeros:
$x = 1$
$x = \sqrt{7}$
$x = -\sqrt{7}$
$(x-1)(x-\sqrt{7})(x+\sqrt{7})$
$(x-1)(x^2 + x\sqrt{7} - x\sqrt{7} - 7)$
$(x-1)(x^2 - 7)$
$x^3 - 7x - x^2 + 7$
$x^3 - x^2 - 7x + 7$
Zeros:
$x = 0$; mult 3
$x = -4i$
$x = 4i$
$x^3(x+4i)(x-4i)$
$x^3(x^2 - 4xi + 4xi - 16i^2)$
$x^3(x^2 - 16i^2)$
$x^3(x^2 - 16(-1))$
$x^3(x^2 + 16)$
$x^5 + 16x^3$
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Math III Study Guide Unit 2

Find the Quotient of the following using the technique as described.

long division

$$\frac{2x^3-9x^2+15}{2x-5}$$

$x^2 - 2x - 5$ R -10

$2x-5 \;|\; 2x^3 - 9x^2 + 0x + 15$

$-(2x^3 + 5x^2)$

$-4x^2 + 0x$

$-(-4x^2 + 10x)$

$-10x + 15$

$-(-10x + 25)$

-10

$x^2 - 2x - 5$ R -10

$x^2 - 2x - 5 \quad \frac{-10}{2x-5}$

synthetic division

$$\frac{3x^4-2x^2+4}{x+1}$$

$-1 \;|\; 3 \quad 0 \quad -2 \quad 0 \quad 4$

$\quad\quad -3 \quad 3 \quad -1 \quad 1$

$3x^3 \quad -3x^2 \quad 1x \quad -1 \quad R\ 5$

$3x^3 - 3x^2 + x - 1$ R 5

COMPLETELY FACTOR THE FOLLOWING GIVEN FACTOR PROVIDED. THEN MAKE A SKETCH BASED ON THE FACTORED FORM

$f(x)=x^3+5x^2-8x-48$ given (x + 4) if a factor.

-4 | 1 5 −8 −48

↓ −4 −4 48

$1x^2$ $1x$ -12

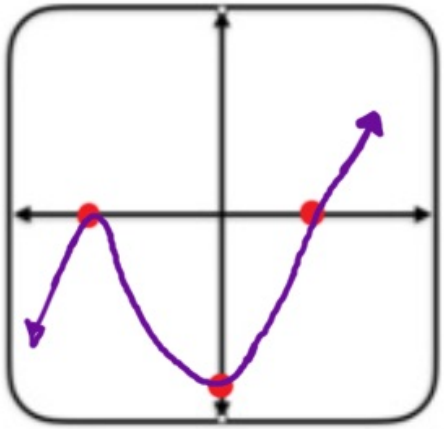
$(x+4)(x^2+x-12)$

-12: 4×-3, 1

$(x+4)(x+4)(x-3)$

$x=-4$ $x=3$

mult 2



$f(x)=-x^4-5x^3-2x^2+8x$ given (x + 2) if a factor.

-2 | −1 −5 −2 8 0

↓ 2 6 −8

$-1x^3$ $-3x^2$ $4x$

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

$(x+2)(x)(-1x^2-3x+4)$

-4: -4×1, -3

x^2-3x-4

$(x-4)(x+1)$

$(x+2)(x)(x+4)(x-1)$

$x=-2$ $x=0$ $x=-4$ $x=1$