Finding Zeroes of Polynomials and Sketching a Possible Graph

The ***fully factored form*** of f(x) is:

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

The ***zeros*** are:

$x=0$ $x=4$ $x=-3$

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

$(0,0)$ $(4,0)$ $(-3,0)$

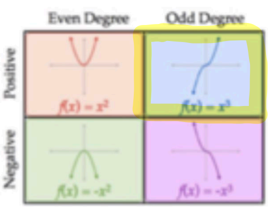
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

if $x \to \infty$ then $y \to$ ∞

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



$$y = x^3 - x^2 - 12x$$

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

$x(x-4)(x+3)$ -12, -4, 3, -1

Zeros

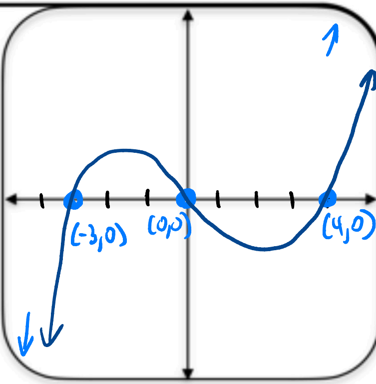
$x=0$ $x-4=0$ $x+3=0$

$x=4$ $x=-3$

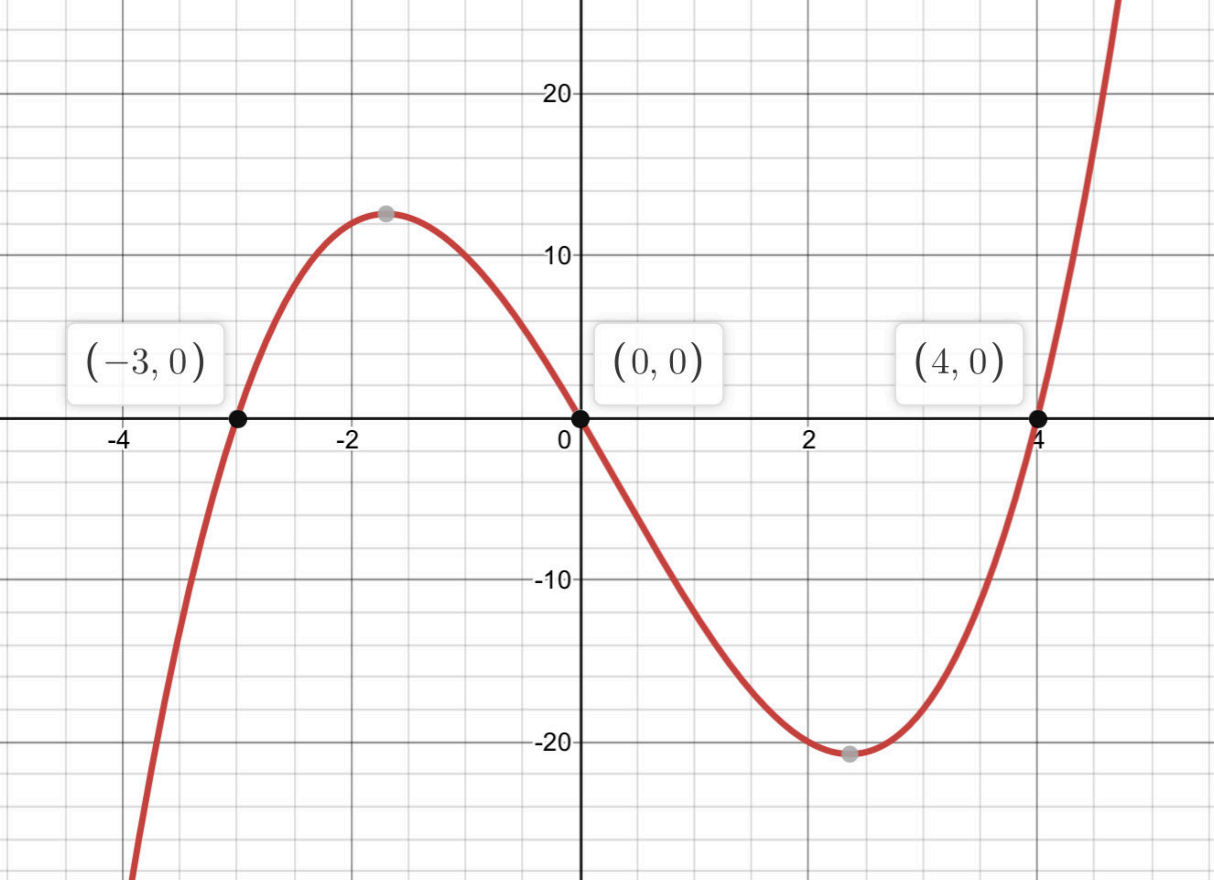
y-int

$(0)^3-(0)^2-12(0)=0$

$(0,0)$



Actual Graph Next Page...



20
10
-10
-20
-4
-2
0
2
4
$(-3, 0)$
$(0, 0)$
$(4, 0)$

The ***fully factored form*** of f(x) is:

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

The ***zeros*** are:

$x=0$; mult 2 $\quad x=4 \quad x=-3$

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

$(0,0) \quad (4,0) \quad (-3,0)$

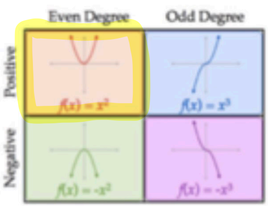
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

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

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



$$y = x^4 - x^3 - 12x^2$$

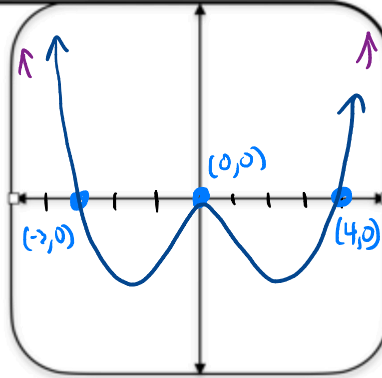
$x^2(x^2 - x - 12)$

$x^2(x-4)(x+3)$ $\quad -12 \quad -4 \quad 3 \quad -1$

Zeros

$x^2=0 \quad x-4=0 \quad x+3=0$

$x=0$; mult 2 $\quad x=4 \quad x=-3$

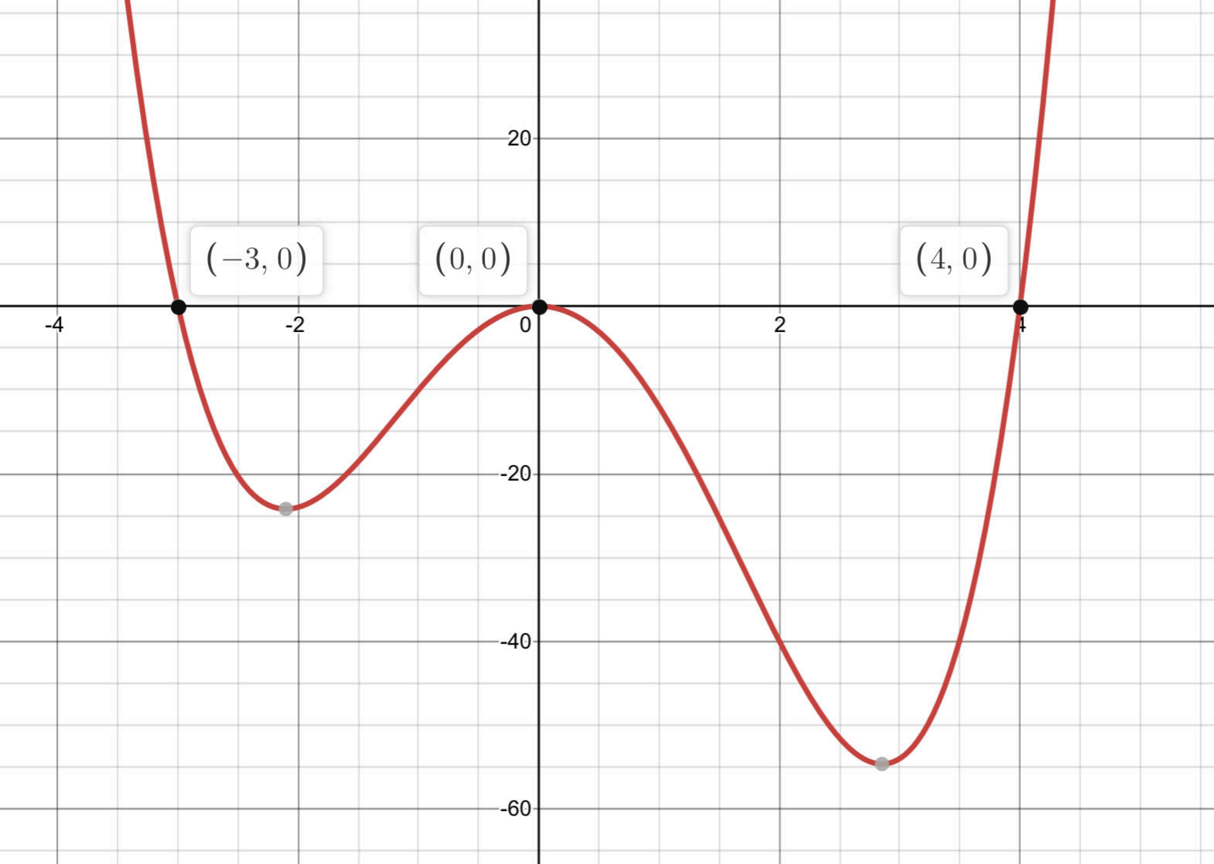


y-int

$(0)^4-(0)^3-12(0)^2=0$

$(0,0)$

Actual Graph Next Page...



(−3, 0)
(0, 0)
(4, 0)
20
-20
-40
-60
-4
-2
0
2
4

The ***fully factored form*** of f(x) is:

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

The **zeros** are:

$x=0$; mult 3 $x=3$

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

$(0,0)$ $(3,0)$

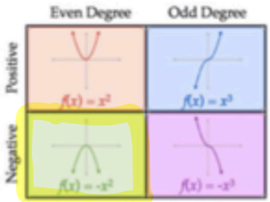
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

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

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



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

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

Zeros

$-2x^3=0$ $x-3=0$

$\overline{-2}$ $\overline{-2}$ $x=3$

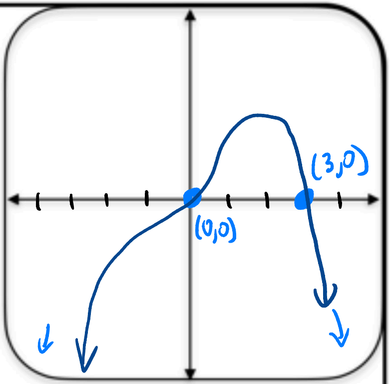
$x^3=0$

$x=0$; mult 3

y-int

$-2(0)^4+6(0)^3=0$

$(0,0)$

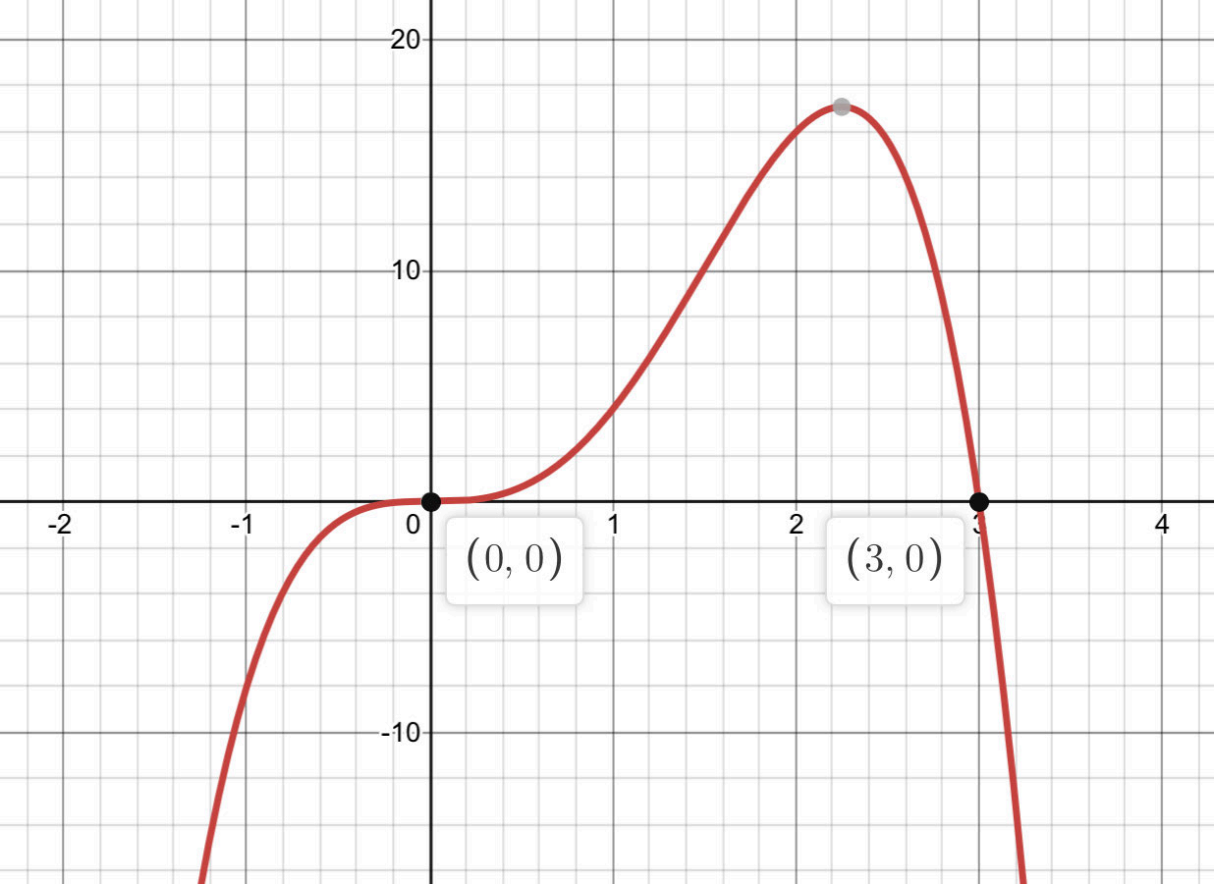


Actual Graph next Page...

The ***fully factored form*** of f(x) is:

The **zeros** are:

$y=-2x^3+6x^2$


20
10
-10
-2
-1
0
1
2
3
4
(0, 0)
(3, 0)

The ***fully factored form*** of f(x) is:

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

The ***zeros*** are:

$x=0$; mult 2 $\quad x=3$

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

$(0,0) \quad (3,0)$

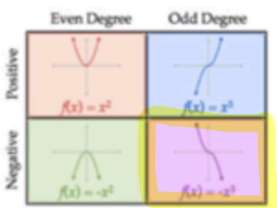
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

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

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



$y = -2x^3 + 6x^2$

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

Zeros

$-2x^2 = 0 \qquad x-3=0$

$\overline{-2} \qquad \overline{-2} \qquad x=3$

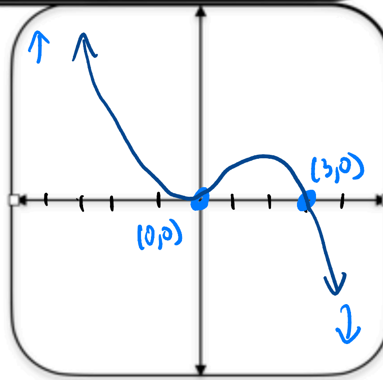
$x^2 = 0$

$x = 0$; mult 2

y-int

$-2(0)^3 + 6(0)^2 = 0$

$(0,0)$



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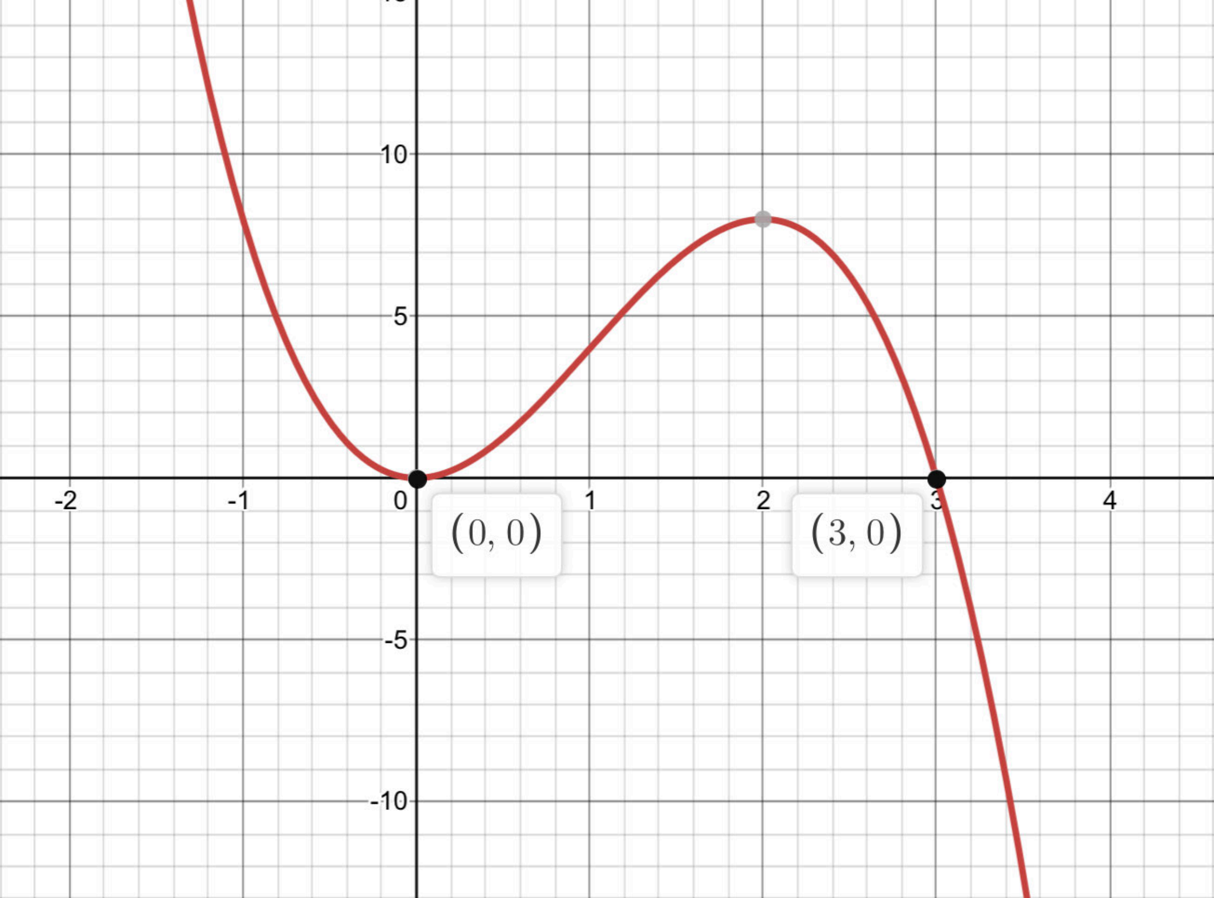

10
5
-5
-10
-2
-1
0
1
2
3
4
$(0, 0)$
$(3, 0)$

The ***fully factored form*** of f(x) is:

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

The ***zeros*** are:

$x=0$; mult 3 $x=3$ $x=-3$

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

$(0,0)$ $(3,0)$ $(-3,0)$

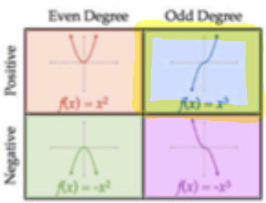
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

if $x \to \infty$ then $y \to$ ∞

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



$$y = x^5 - 9x^3$$

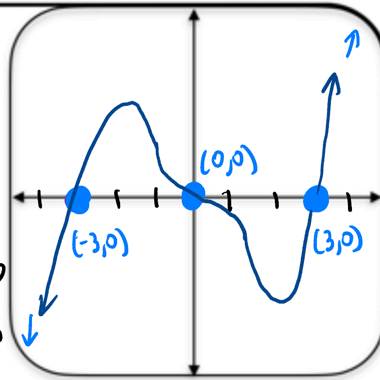
$x^3(x^2-9)$

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

Zeros

$x^3=0$ $x-3=0$ $x+3=0$

$x=0$; mult 3 $x=3$ $x=-3$



y-int

$(0)^5-9(0)^3=0$

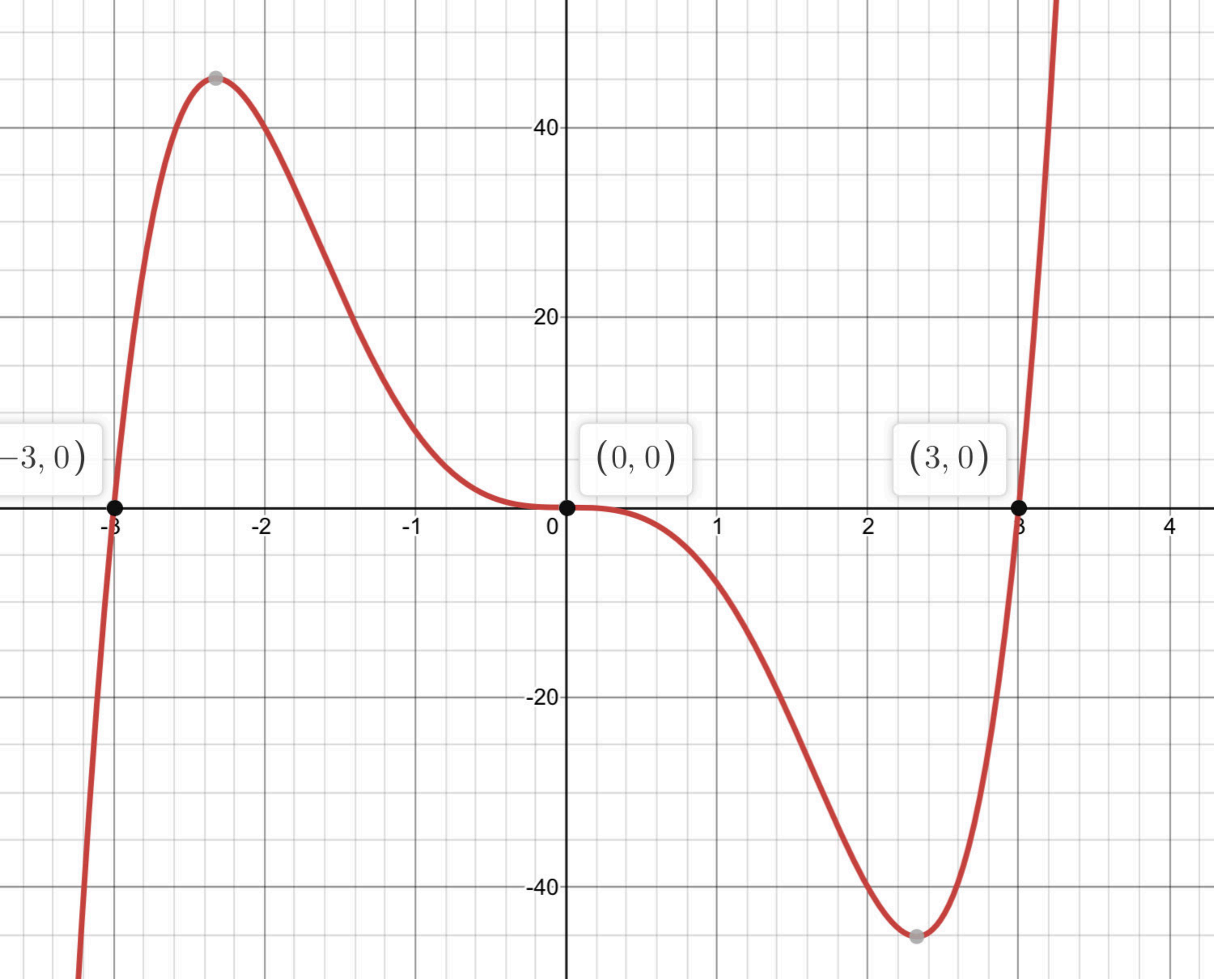
$(0,0)$

Actual Graph next Page

The ***fully factored form*** of f(x) is:

$$y = x^6 - 15x^4$$

The ***zeros*** are:



40
20
-20
-40
-3
-2
-1
0
1
2
3
4
(−3, 0)
(0, 0)
(3, 0)

The ***fully factored form*** of f(x) is:

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

The ***zeros*** are:

$x\approx 3.873$ $x\approx -3.873$

$x=0$; mult 4 $x=\sqrt{15}$ $x=-\sqrt{15}$

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

$(0,0)$ $(3.873,0)(-3.873,0)$

$(\sqrt{15},0)$ $(-\sqrt{15},0)$

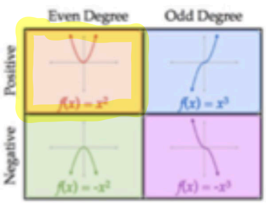
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

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

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



$$y = x^6 - 15x^4$$

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

Zeros

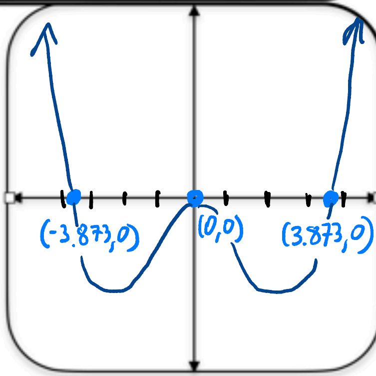
$x^4=0$ $x^2-15=0$

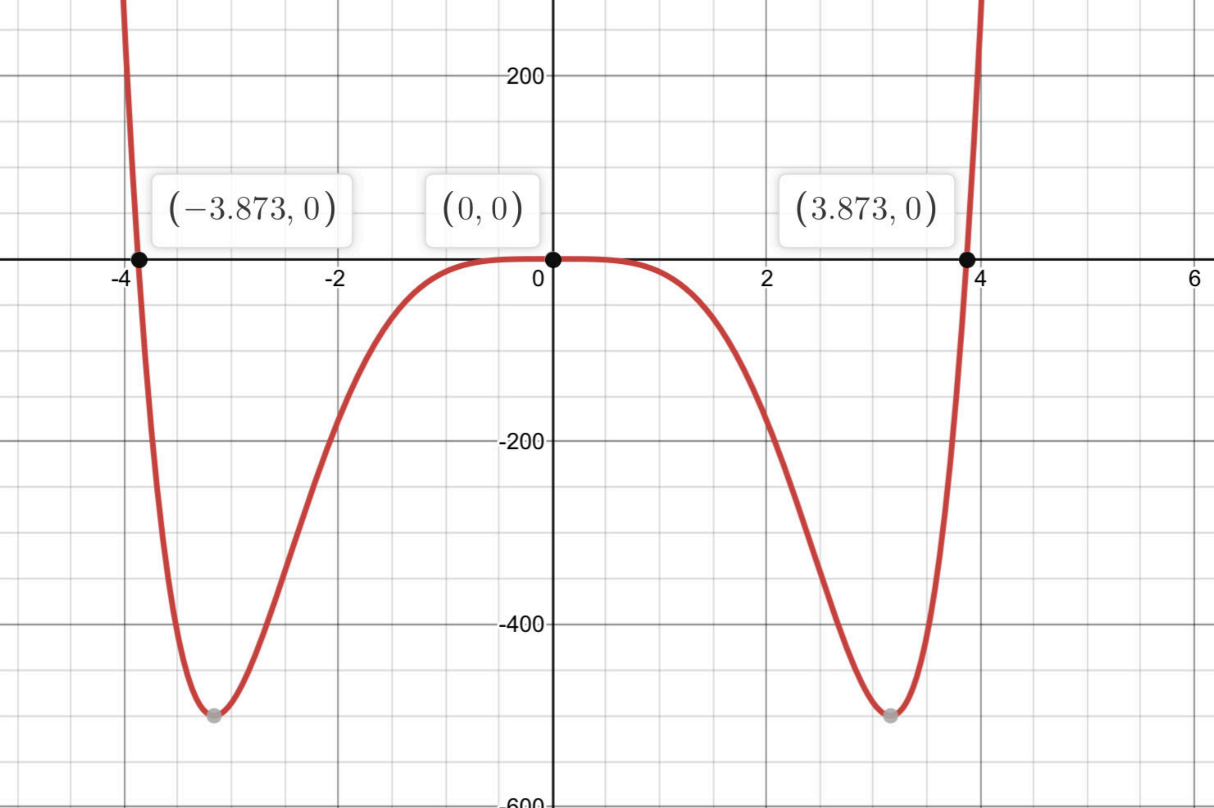
$x=0$; mult 4 $\sqrt{x^2}=\sqrt{15}$

$x=\pm\sqrt{15}$

y-int

$(0)^6-15(0)^4=0$





200
-200
-400
-600
-4
-2
0
2
4
6
(−3.873, 0)
(0, 0)
(3.873, 0)

The ***fully factored form*** of f(x) is:

$x(x^2-4x-6)$

The ***zeros*** are:

$x \approx 5.162$ $x \approx -1.162$

$x=0$ $x=2+\sqrt{10}$ $x=2-\sqrt{10}$

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

$(5.162,0)$ $(-1.162,0)$

$(0,0)$ $(2+\sqrt{10},0)$ $(2-\sqrt{10},0)$

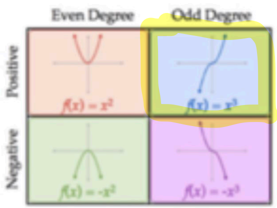
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

if $x \to \infty$ then $y \to$ ∞

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



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

$x(x^2-4x-6)$

can't factor so need to use quadratic formula

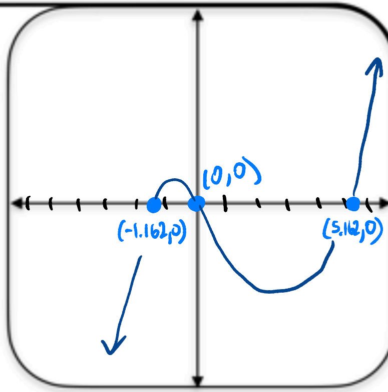
$1x^2-4x-6$

Ax^2+Bx+C

$A=1$ $B=-4$ $C=-6$

$$\frac{-(-4) \pm \sqrt{(-4)^2-4(1)(-6)}}{2(1)}$$

$$\frac{4 \pm \sqrt{40}}{2} \rightarrow \frac{\cancel{4}^{2} \pm \cancel{2}^{1}\sqrt{10}}{\cancel{2}_{1}} \rightarrow 2 \pm \sqrt{10}$$



Quad Formula

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

Breaking down $\sqrt{40}$

$\sqrt{40}$

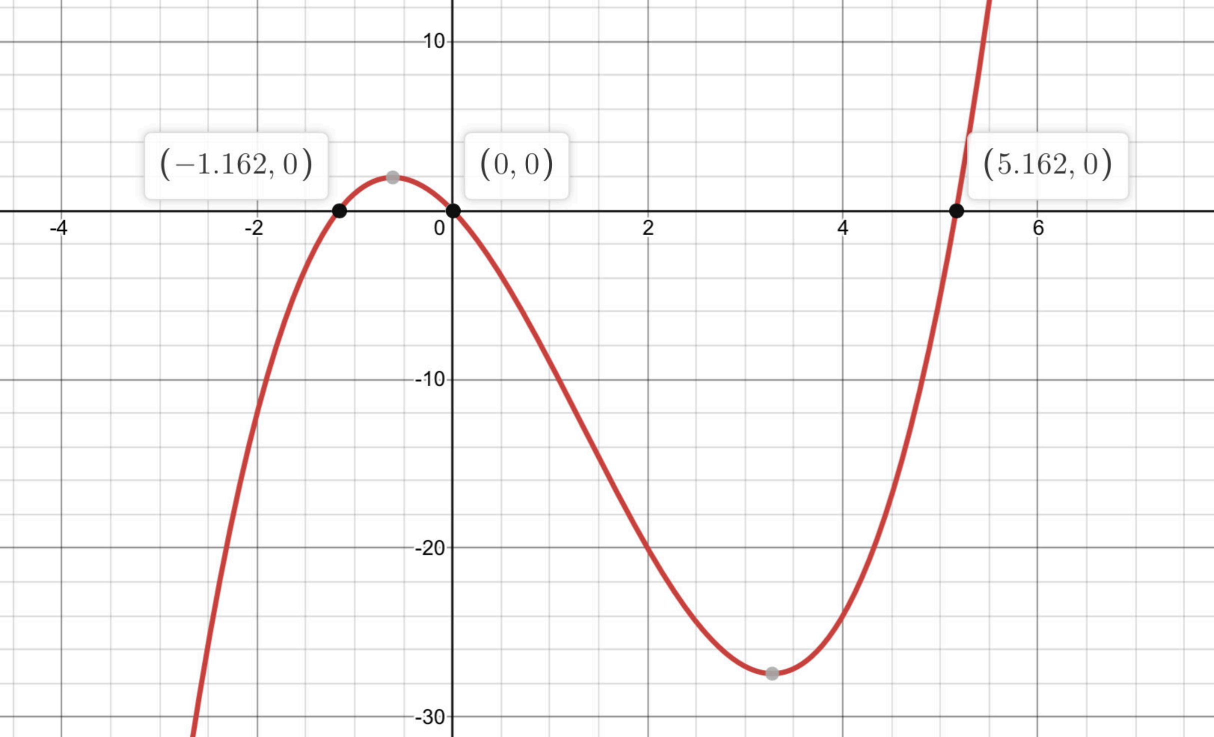
4 10

2 2 2 5

$2\sqrt{10}$

$$y = x^6 - 4x^5 - 6x^4$$

The ***fully factored form*** of f(x) is:



10
-10
-20
-30
-4
-2
0
2
4
6
(−1.162, 0)
(0, 0)
(5.162, 0)

The ***fully factored form*** of f(x) is:

$x^4(x^2-4x-6)$

The ***zeros*** are:

$x=0$; mult 4 $\quad x=2+\sqrt{10} \quad x=2-\sqrt{10}$

$x\approx 5.162 \quad x\approx -1.162$

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

$(0,0) \quad (2+\sqrt{10},0) \quad (2-\sqrt{10},0)$

$(5.162,0) \quad (-1.162,0)$

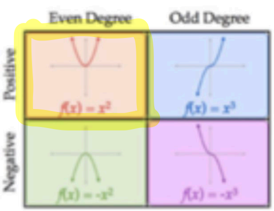
The ***y-intercept*** of the polynomial is:

$(0,0)$

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

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

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

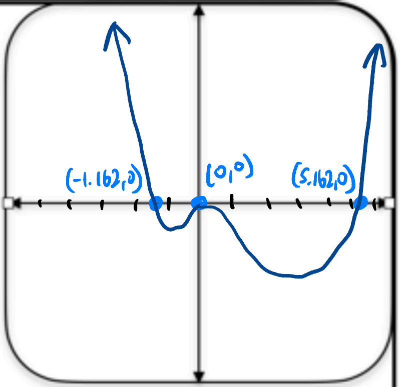


$y = x^6 - 4x^5 - 6x^4$

$x^4(x^2-4x-6)$

mult 4

can't factor so need to use quadratic formula



$1x^2-4x-6$

Ax^2+Bx+C

$A=1 \quad B=-4 \quad C=-6$

$$\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(-6)}}{2(1)}$$

$$\frac{4\pm\sqrt{40}}{2} \to \frac{\cancel{4}^{2}\pm\cancel{2}^{1}\sqrt{10}}{\cancel{2}_{1}} \to 2\pm\sqrt{10}$$

Quad Formula

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

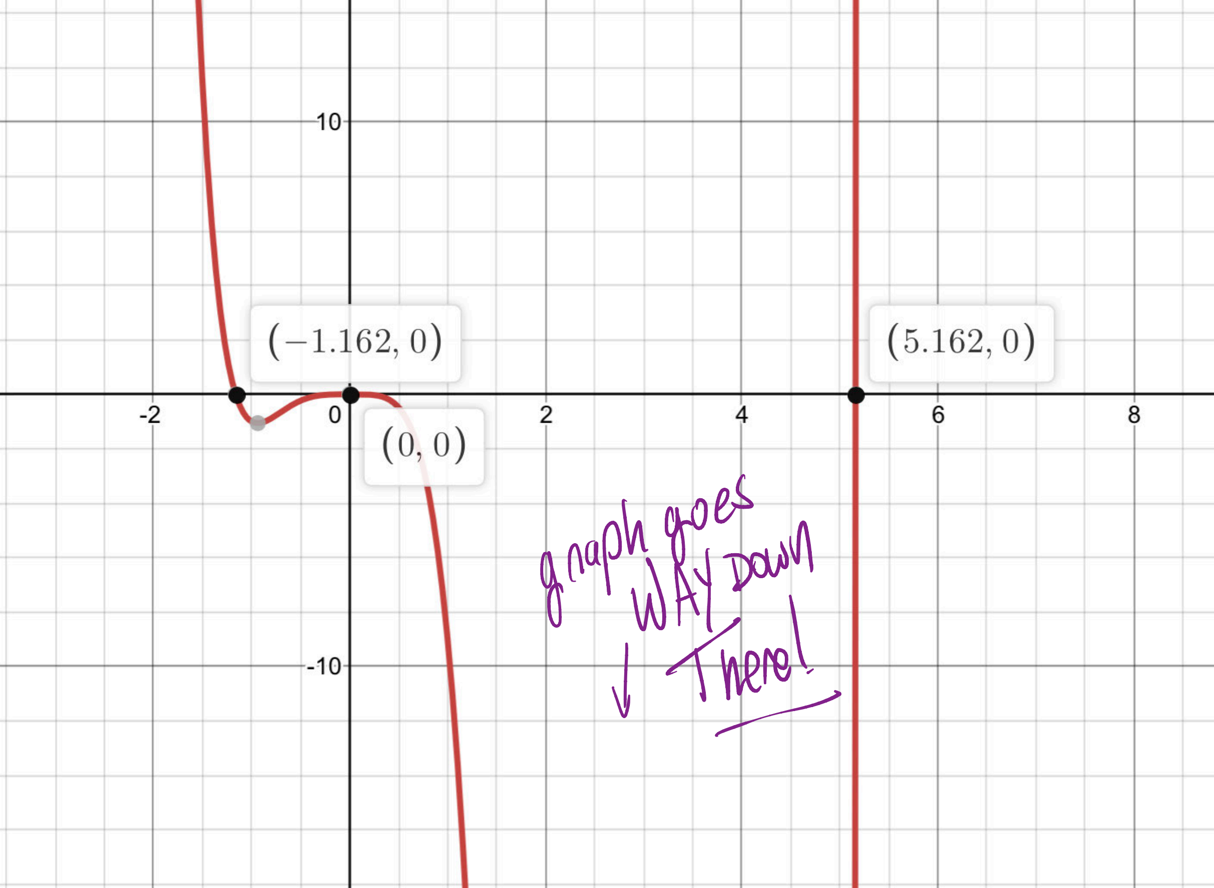
Breaking down $\sqrt{40}$

$\sqrt{40}$

4 10

2 2 2 5

$2\sqrt{10}$


10
-10
-2
0
2
4
6
8
(−1.162, 0)
(0, 0)
(5.162, 0)
graph goes WAY Down There!