

**How the leading coefficient affects the shape of a parabola**

Fill in the information about the parabolas below.

	$y = -2x^2$	$y = \frac{3}{4}x^2$	$y = -4x^2$	$y = \frac{1}{2}x^2$
(a) For each parabola, choose whether it opens up or down	Select One ▾	Select One ▾	Select One ▾	Select One ▾
(b) Choose the parabola with the widest graph	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(c) Choose the parabola with the narrowest graph	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	$y = -2x^2$	$y = \frac{3}{4}x^2$	$y = -4x^2$	$y = \frac{1}{2}x^2$
(a) For each parabola, choose whether it opens up or down	down ▾	up ▾	down ▾	up ▾
(b) Choose the parabola with the widest graph	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
(c) Choose the parabola with the narrowest graph	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

$$(2x)^2 = 4x^2$$

Smush Stretch

## Transformation of Functions PEMdAs

1. Smushing then

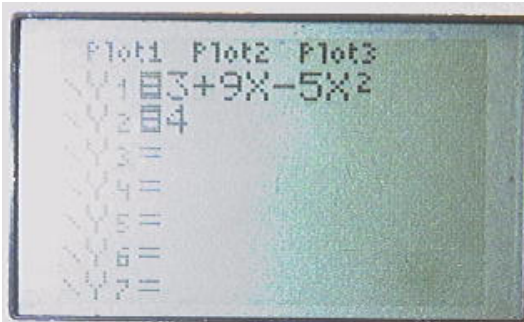
Left and Right

2. Stretching / Shrinking

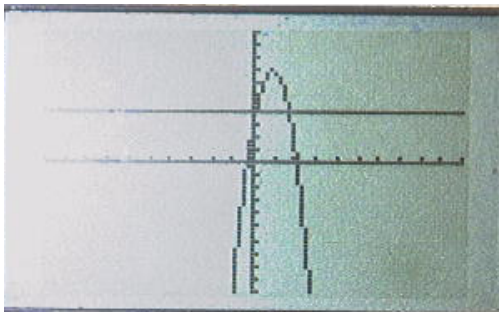
and reflection happen at same time!

3. Raise or Lower

## Solving equation using calculator

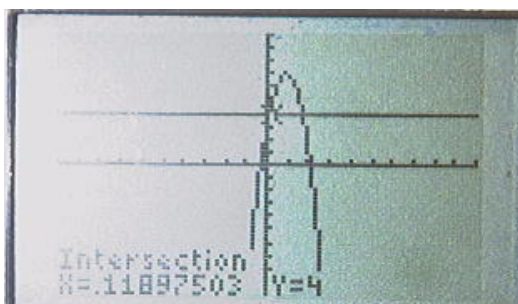


zoom 6



calc 5 intersect

enter enter enter



calc 5 intersect

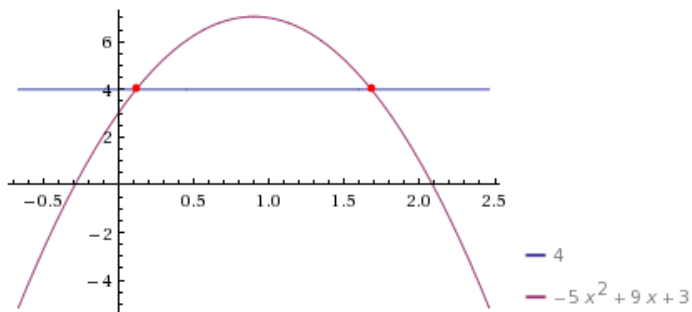
enter enter &gt;&gt;&gt;&gt;&gt;2(guess)

## Solving using Wolfram Alpha .com

Input:

$$4 = 3 + 9x - 5x^2$$

Plot:



Alternate forms:

$$5x^2 + 1 = 9x$$

$$5x^2 - 9x + 1 = 0$$

$$\frac{100}{61} \left( x - \frac{9}{10} \right)^2 = 1$$

Solutions:

[More digits](#) [Exact](#)

$$x = 0.11898$$

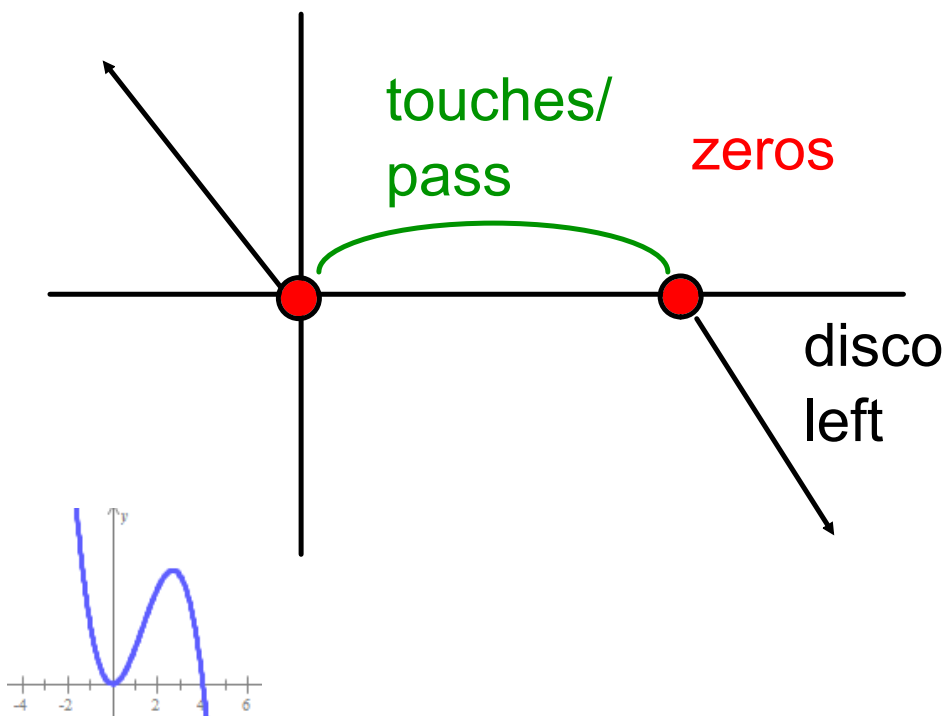
$$x = 1.6810$$

## Zeros of Polynomials

$$g(x) = -2x^3 + 8x^2 = -2(x)(x)(x-4) \quad \text{Factored Form}$$

Zeros: 0,0,4

Touches at  $x=0$  Pass Thru at  $x=4$



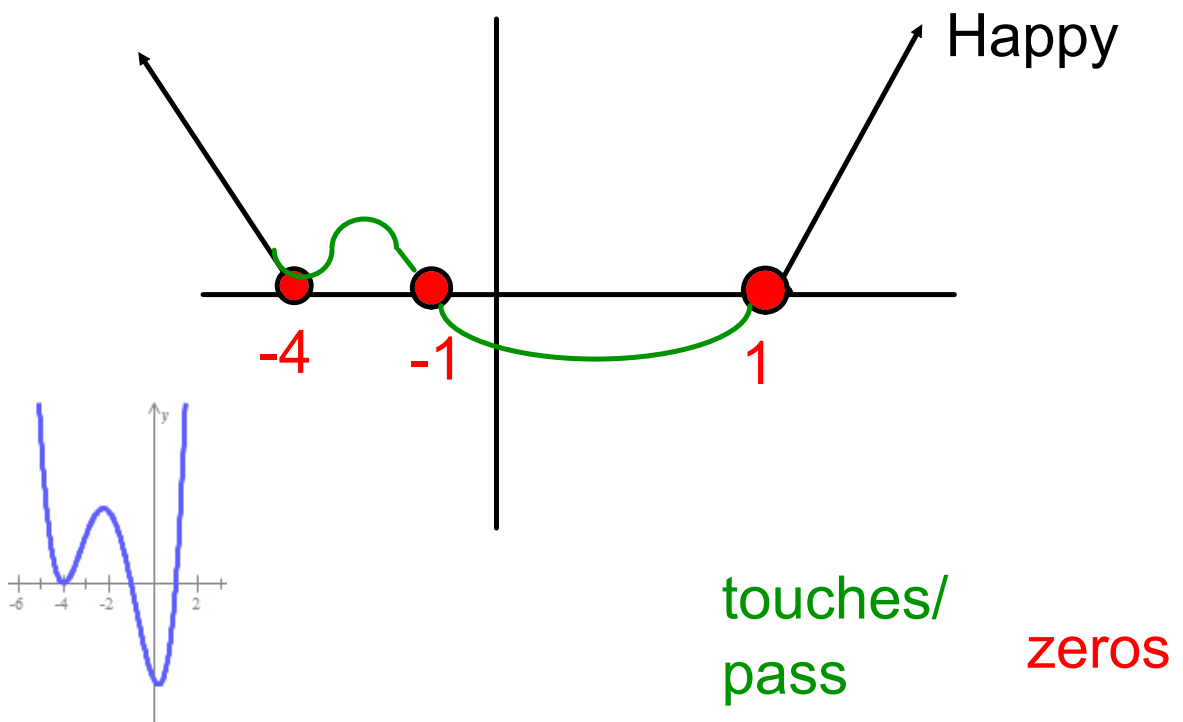
$$h(x) = (x+4)^2(x^2-1) = (x+4)(x+4)(x-1)(x+1)$$

zeros -4, -4, 1, -1

touches -4 pass 1, -1

degree: 4 Lead: +1

happy parabola ending



<p>(a) <math>f(x) = 3x^6 - 3x^5 - 6x^2 - 2x</math></p> <p>Even pos Happy</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Falls to the left and rises to the right</li> <li><input type="radio"/> Rises to the left and falls to the right</li> <li><input checked="" type="radio"/> Rises to the left and rises to the right</li> <li><input type="radio"/> Falls to the left and falls to the right</li> </ul>
<p>(b) <math>f(x) = x^4 + 7x^2 + 6x + 1</math></p> <p>Even pos Happy</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Falls to the left and rises to the right</li> <li><input type="radio"/> Rises to the left and falls to the right</li> <li><input checked="" type="radio"/> Rises to the left and rises to the right</li> <li><input type="radio"/> Falls to the left and falls to the right</li> </ul>
<p>(c) <math>f(x) = 4x^1(x - 4)^1(x + 2)^1</math></p> <p>Degree 3 (odd) Lead 4 (positive) disco right</p>	<ul style="list-style-type: none"> <li><input checked="" type="radio"/> Falls to the left and rises to the right</li> <li><input type="radio"/> Rises to the left and falls to the right</li> <li><input type="radio"/> Rises to the left and rises to the right</li> <li><input type="radio"/> Falls to the left and falls to the right</li> </ul>

Discuss....

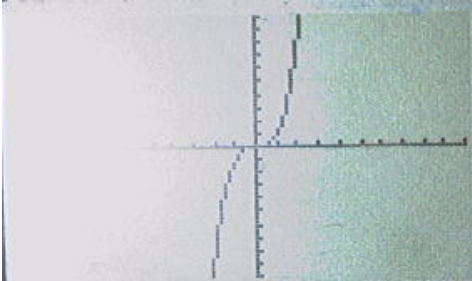
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Degree 3

End Behaviour: Disco

Faces: 3





Jig

has 3 faces or more

Whats happening at  $x=0$ ?

Passing thru means zero

repeated ODD number of times

looks like a jig= 3,5,7,

## **FUNDAMENTAL THEOREM OF ALGEBRA: DEGREE = NUMBER OF ZEROS**

**Degree = 4 , but only 2 are real**

**then the other two are complex. AND they are complex conjugates**