What to "get" from yesterday:

Cubic functions can be "built" from

- the product of 3 linear functions.
  OR
- the product of 1 linear and 1 quadratic function.

The domain of a function may change if the function represents a "real" situation.

How are $y = x$ and $y = x^2$ alike?

below are some possible answers:

- Both are polynomials
- Both have a domain of $(-\infty,\infty)$

How are $y = x$ and $y = x^2$ different?

below are some possible answers:

- y=x either increases or decreases throughout whereas $y = x^2$ both increases and decreases
- they have different ranges.
  Range for y=x is $(-\infty,\infty)$
  Range for a parabola is either $y \geq$ y at vertex or $y \leq$ y at vertex
- y=x has a constant rate of change whereas $y=x^2$ doesn't.
- y=x has one x-intercept whereas $y=x^2$ can have two x-intercepts

What is the simplest 3rd-degree polynomial?

$y = x^3$ but there is no Parent Cubic function

Will $y=x^3$ behave more like y=x or more like $y=x^2$?

we'll try to answer this question later

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Exploring; "Quadratic and Cubic" Page 1

Pay attention to the general shapes that a cubic can take.

The two "classic" shapes of cubics:

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SAS3: Answer Question 1

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Exploring; "Quadratics and Cubics" page 2

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SAS3: Answer Question 2

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SAS3: Answer Question 3

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SAS3: Answer Question 4

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SAS3: Answer Question 5

one possible answer is $y = |x|$

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SAS3: Answer Question 6

one possible answer is $y = - |x|$

Absolute Maximum

the largest value (highest pt)
on the ENTIRE function(graph)

Absolute Minimum

the smallest value (lowest pt)
on the ENTIRE function(graph)

Relative Maximum

the largest value (highest pt)
over a small area of the
function(graph)

Relative Minimum

the smallest value (lowest pt)
over a small area of the
function(graph)

What are some similarities between $y = x$ and $y = x^3$

- They both have a domain of $(-\infty,\infty)$
- They both can either increase or decrease throughout
- Neither has an Absolute Max or Absolute Min.
- Both of their degrees are ODD!
- The range of both is $(-\infty,\infty)$

What are some differences between $y = x$ and $y = x^3$

- The graph of $y=x$ is a line and the graph of $y=x^3$ is a curve.
- $y=x$ always either increases or decreases throughout whereas $y=x^3$ can increase and decrease on the same graph.
- $y=x$ has no Max's or Min's of any type whereas $y=x^3$ can have relative min's or max's.

Is $y = x^3$ more like $y=x$ or $y=x^2$?

This is a matter of opinion but it seems that $y=x^3$ behaves more like $y=x$.

What is the general shape of a Quadratic graph?

A parabola. If the parabola opens up it has an Absolute Min but no Absolute Max. If the parabola opens down it has an Absolute Max but no Absolute Min.

What is the general shape of a cubic graph?

There is no one general shape of a cubic. They fall into two basic categories, the "classic" shapes mentioned earlier.

How many maximum or minimum values might you expect a quadratic have?

Either One Absolute Max or Min and no Relative Max's or Min's

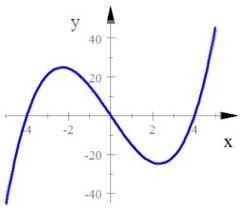
How many maximum or minimum values might you expect a cubic to have?

Never will have either an Absolute Max nor an Absolute Min but
it might have a Relative Max and Min.

Together, Absolute and Relative Max's and Min's are called

Extremes or Extrema

All cubics have rotational symmetry about a point.



this means that if we rotate the graph 180° about a certain point it will match up with itself

In this case the point to rotate about is the origin.

Hwk #19

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More Practice: problems 7-10

And

Agilemind - Topic 4 - Intro to Polynomials
SAS3 - Question 8.