1.3 Properties of Graphs of Functions

Math Learning Target:

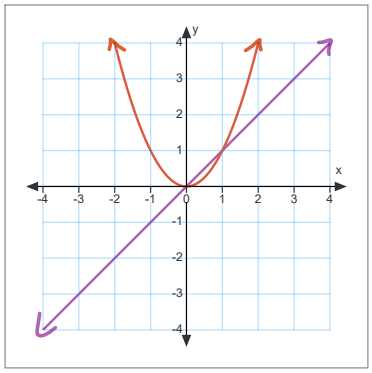
"I can compare properties between parent functions, and within a parent function's family."

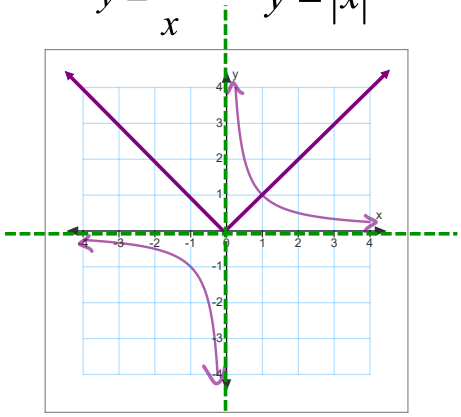
A **transformation** is a geometric operation, such as a translation, reflection and compression.

Each transformation is performed on a parent relation. There are many parent relations.
A **parent function** belongs to the set of parent relations and is the simplest function in a family of functions.
For example, the family of quadratic functions are all constructed from $y = x^2$.

Here are the *seven* parent functions that will be used often:

$y = x$ $\quad$ $y = x^2$ $\quad$ $y = \frac{1}{x}$ $\quad$ $y = |x|$





$y = x$ Interval(s) of increase:
Interval(s) of decrease:
End behaviours:

$y = \frac{1}{x}$ Interval(s) of increase:
Interval(s) of decrease:

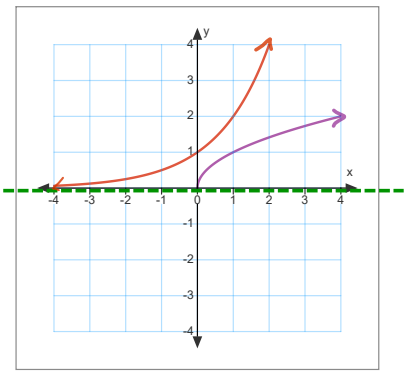
End behaviours:

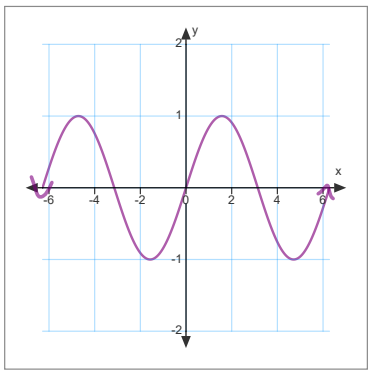
$y = x^2$ Interval(s) of increase:
Interval(s) of decrease:
End behaviours:

$y = |x|$ Interval(s) of increase:
Interval(s) of decrease:
End behaviours:

***Recall: Did you include "0" in one interval OR the other.**

$y = \sqrt{x}$ $\quad$ $y = b^x$ i.e. $b = 2$ $y = 2^x$ $\quad$ $y = \sin(x)$





$y = \sqrt{x}$ Interval(s) of increase:
Interval(s) of decrease:
End behaviours:

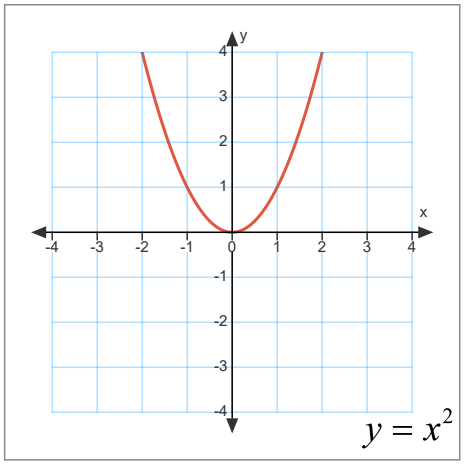
$y = \sin(x)$ End behaviours:

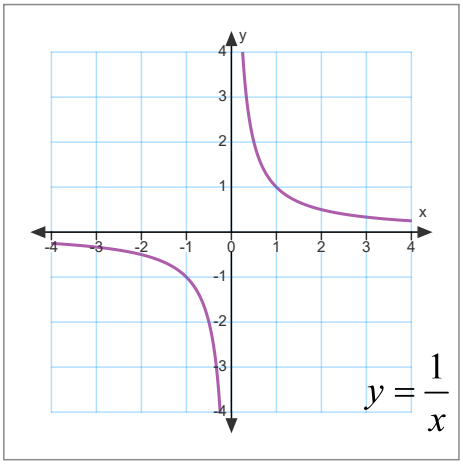
$y = 2^x$ Interval(s) of increase:
Interval(s) of decrease:
End behaviours:

CHALLENGE! Can you determine expressions for the intervals of increase and intervals of decrease?

"Symmetry"

A function is **odd** when $f(-x) = -f(x)$ A function is **even** when $f(-x) = f(x)$





Graphically, a function is even when

Graphically, a function is odd when

Ex.1 Is $y = x^2$ even, odd, or neither? Prove algebraically.

Ex.2 Is $y = \frac{1}{x}$ even, odd, or neither? Prove algebraically.

Do: pg. 23 #3*, 4ad, 5**, 6, 7, 8, 10***, 15

* Error in answer: the function can be derived from <u>any</u> $y=b^x$, for any valid "b"),

** The instructions are poor. Simply apply what was learned today in the lesson.

***In #10a, in the <u>instructions</u> for the question change $(-\infty, -2)$ to $(-\infty, 2]$

positive 2

square bracket

YES, you have permission to write in the textbook to make this change!