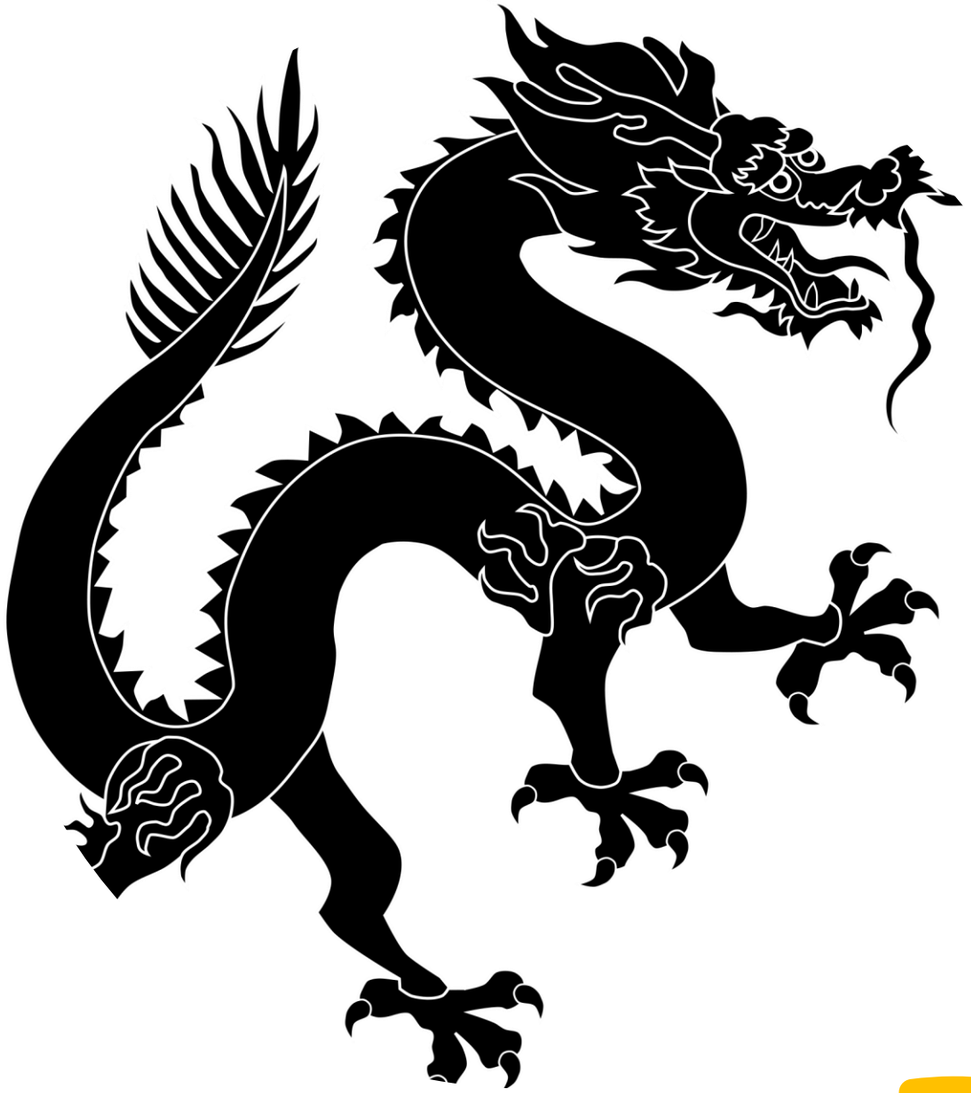

Functions and Function Notation

College Algebra

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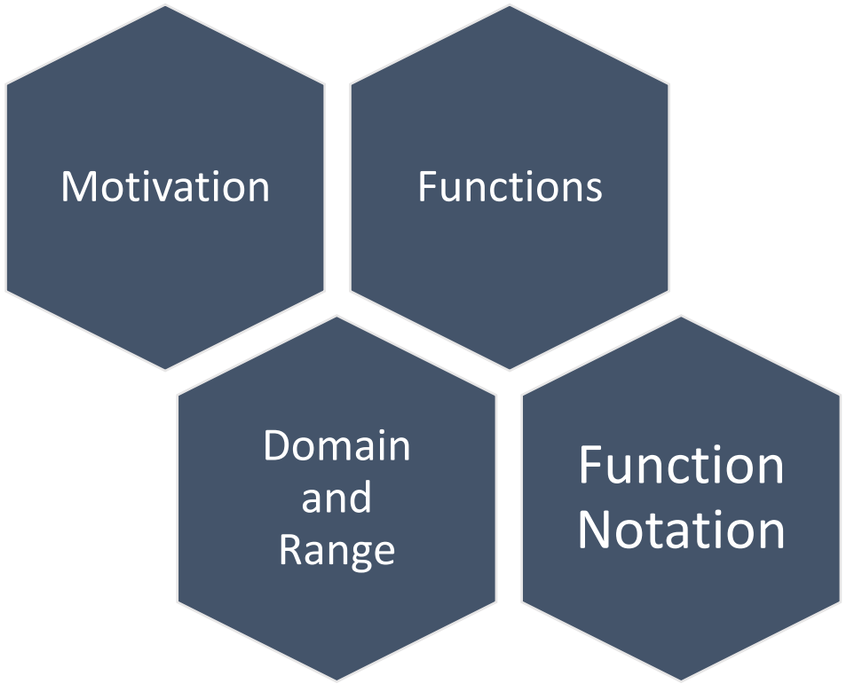
Overview



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Motivation

Functions and Function Notation

Motivating Example

- Let’s get used to the concept of a function before we before we start using numbers.

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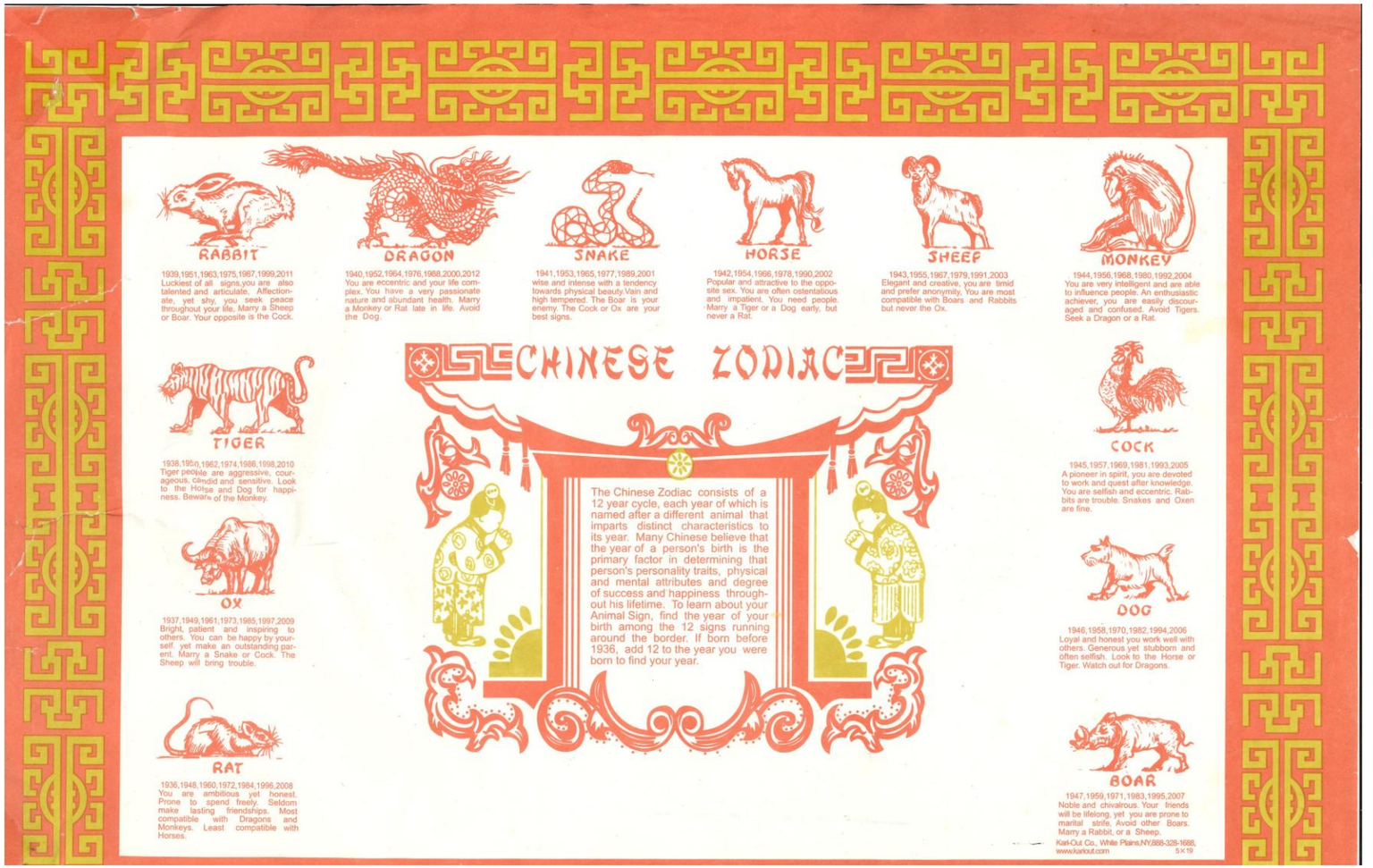
Chinese Zodiac



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A Closer Look 1

- Every year corresponds to **exactly one** sign in the Chinese Zodiac
- The year 1942 corresponds to the Horse

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A Closer Look 2

- Every sign has **exactly one** opposite sign.
- The sign opposite the Horse is the Rat.

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A Closer Look 3

- Every sign has **two** friendly signs.
- The friends of the horse are the Tiger and Dog.

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Functions

Functions and Function Notation

Definition of a Function

A **function** is a relation in which each possible input value leads to exactly one output value. We say, “the output is a function of the input.”

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Summary

- The correspondence from years to signs is a function.
- The correspondence from signs to opposite signs is a function.
- The correspondence from signs to friendly signs is **not** a function.

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Domain and Range

Functions and Function Notation

Definition of Domain and Range

The **input** values of a function make up the **domain**, and the **output** values make up the **range**.

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Example 1

For the function between years and signs:

- The domain is the set of **all** years.
- The range is the set of **all** signs.

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Example 2

For the function between signs and opposite signs:

- The domain is the set of **all** signs.
- The range is also the set of **all** signs.

Note

Domain and range are more important later in the course.

Function Notation

Functions and Function Notation

Idea Behind Function Notation

- Writing “The sign corresponding to the year 1942 is the Horse” takes a lot of time.
- To save writing, we use function notation.

Definition of Function Notation

- The notation $y = f(x)$ defines a function named f.
- This is read as "y is a function of x".
- The variable x represents the input value, or independent variable.
- The variable y, represents the output value, or dependent variable.

Example 3

- Let s be the function that tells the sign that corresponds to a year.
- $s(1987) =$ Rabbit
- $s(1981) =$ Rooster
- $s(2001) =$ Snake

Years	Sign
… 1972, 1984, 1996 …	Rat
… 1973, 1985, 1997 …	Ox
… 1974, 1986, 1998 …	Tiger
… 1975, 1987, 1999 …	Rabbit
… 1976, 1988, 2000 …	Dragon
… 1977, 1989, 2001 …	Snake
… 1978, 1990, 2002 …	Horse
… 1979, 1991, 2003 …	Sheep
… 1980, 1992, 2004 …	Monkey
… 1981, 1993, 2005 …	Rooster
… 1982, 1994, 2006 …	Dog
… 1983, 1995, 2007 …	Boar

Example 4

- Let o be the function that tells the opposite of a sign.
- $o(\text{Rabbit}) = \text{Rooster}$
- $o(\text{Dragon}) = \text{Dog}$
- $o(\text{Tiger}) = \text{Monkey}$

Sign	Opposite
Rat	Horse
Ox	Sheep
Tiger	Monkey
Rabbit	Rooster
Dragon	Dog
Snake	Boar
Horse	Rat
Sheep	Ox
Monkey	Tiger
Rooster	Rabbit
Dog	Dragon
Boar	Snake