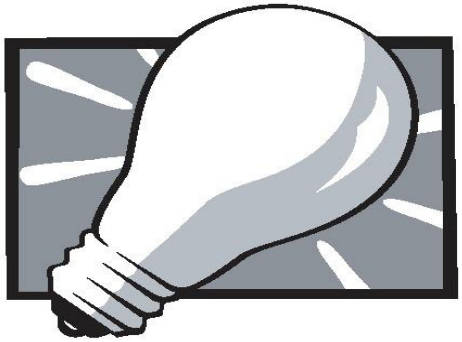
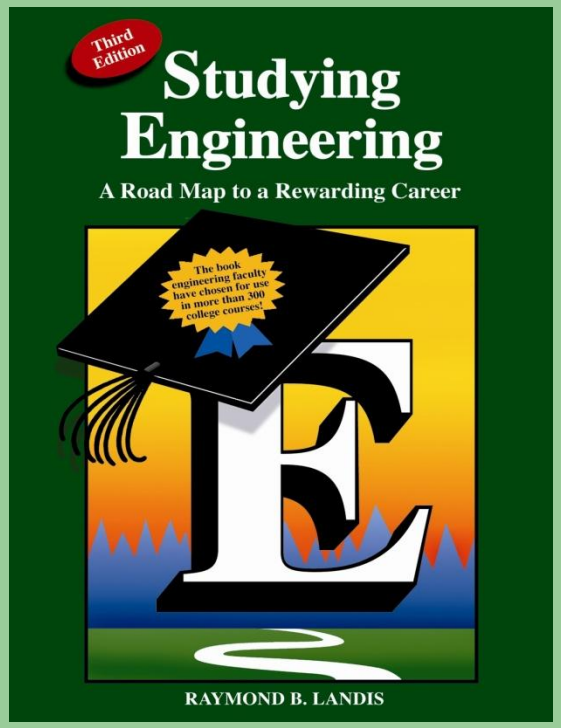


Chapter 5

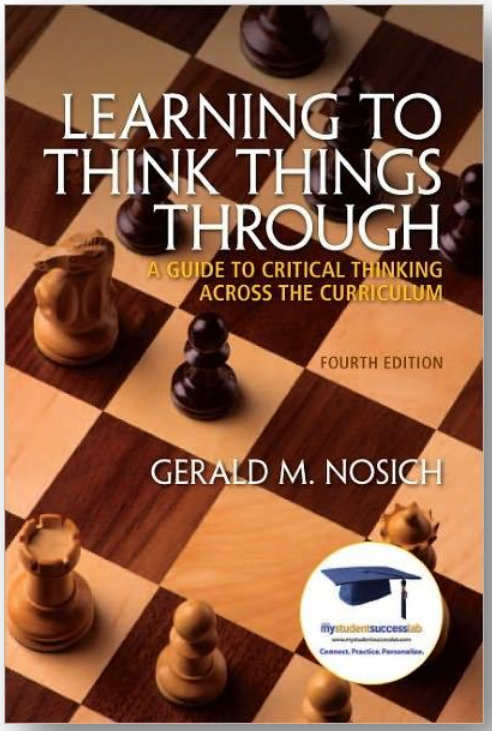
Making the Learning Process Work for You

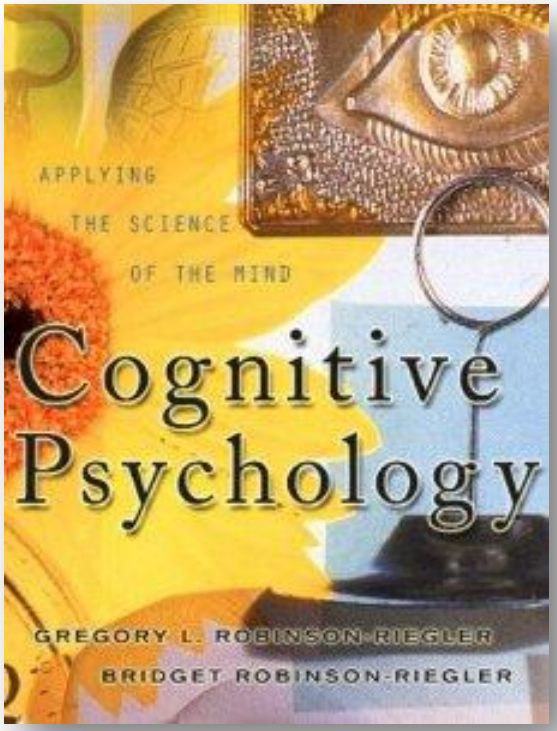


Elaborative Rehearsal

Lecture Overview

- Vocabulary of the Discipline
- Definitions
- Fundamental Concepts





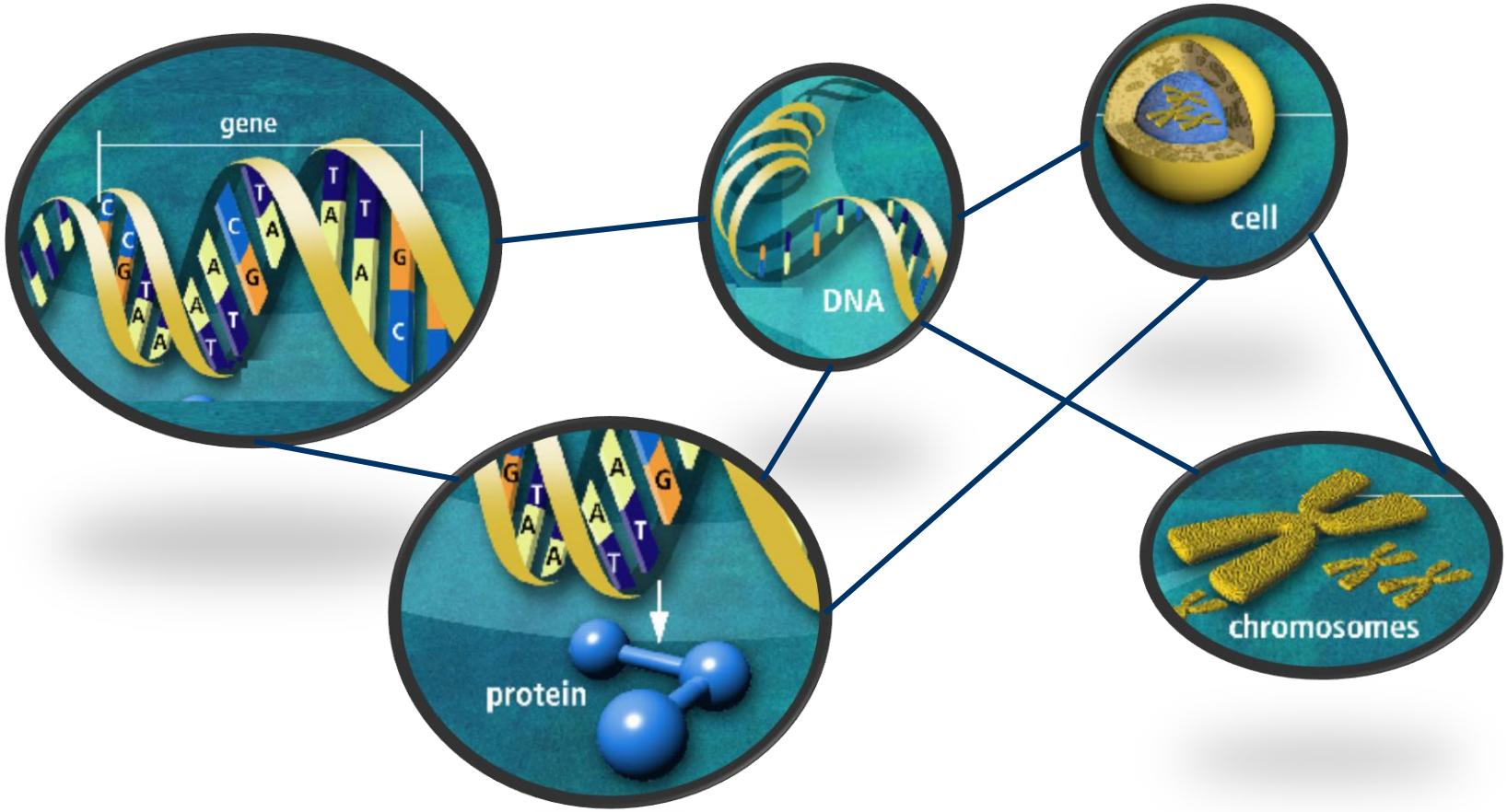
Vocabulary

Knowing Vocabulary of a Discipline Increases your ability

- To think clearly
- To communicate clearly
- To gain insights into fundamentals of the discipline

Vocabulary

- Vocabulary of a Discipline is like a web it is interconnected
- It helps you thinking in terms of logical connections rather than fragments



Definitions

Thinking of the meaning:

- What kind of creature does the definition apply to?
- How do we check to see if it's satisfied?
- Does *anything* satisfy this definition?
- Does anything *not* satisfy this definition?
- What kind of problems can we solve with it?

Definitions

Definition. A **set** is an unordered collection of objects with no repetitions.

$S = \{ 1, 2, 3 \}$ $A = \{ a, b, c \}$ $B = \{1, 2, 3, 1\}$

Thinking of the meaning:

1. What objects does it apply to?
2. How do we check to see if it's satisfied?
3. Does *anything* satisfy this definition?
4. Does anything *not* satisfy this definition?
5. What kind of problems can we solve with it?

Definitions

Definition. A **set** is an unordered collection of objects with no repetitions.

Making associations:

$N = \{ 1, 2, 3, 4, 5, \ldots \}$ a set of natural numbers

$\Sigma = \{ a, b, c, d, e, f, g, \ldots \}$ English alphabet

A set of students

A set of states

Definitions

Definition. A **function** is a rule of correspondence between two sets such that there is a unique element in the second set assigned to each element in the first set.

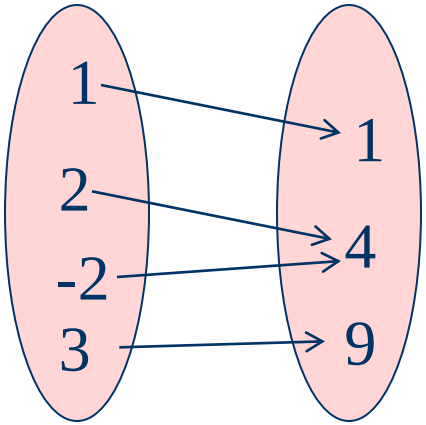
Thinking of the meaning:

1. What objects does it apply to?
2. How do we check to see if it's satisfied?
3. Does *anything* satisfy this definition?
4. Does anything *not* satisfy this definition?
5. What kind of problems can we solve with it?

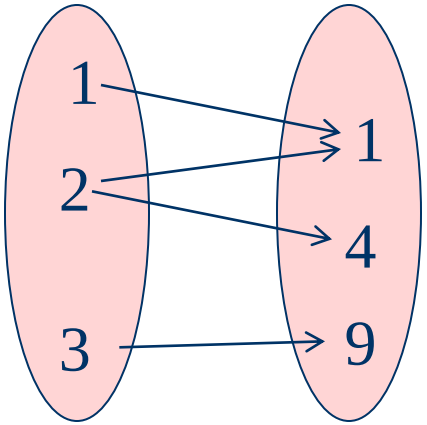
Definitions

Definition. A **function** is a rule of correspondence between two sets such that there is a unique element in the second set assigned to each element in the first set.

Making associations:



Function

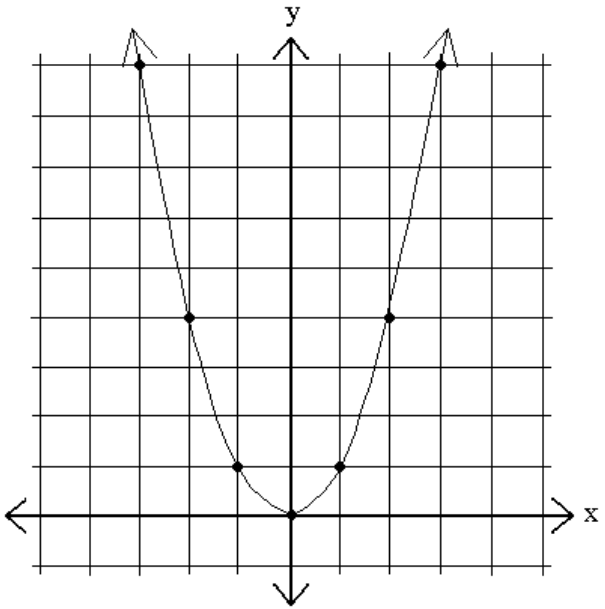


Not a function

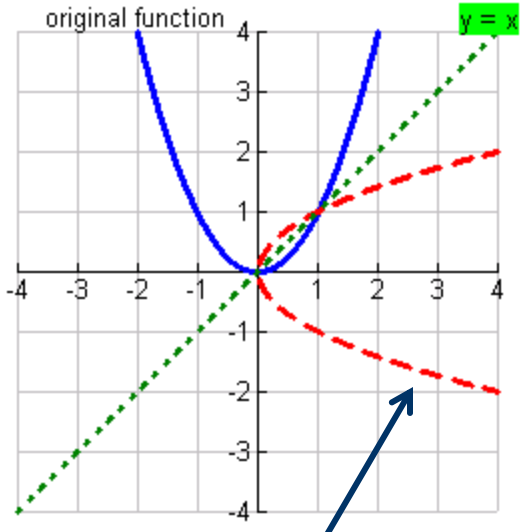
Definitions

Definition. A **function** is a rule of correspondence between two sets such that there is a unique element in the second set assigned to each element in the first set.

Making associations:



Function



Not a function

Fundamental Concepts

I have ownership of the course's content when

- I understand the course concepts
- I can raise relevant questions about them
- I can apply them to new situations

Fundamental Concepts

A **fundamental and powerful** concept is one that can be used to explain or think out a huge body of questions, problems, information or situations.

The F&P concepts are the most central and useful ideas in the discipline.

If you understand F&P concepts in a deep way, you are in a position to understand a great deal of the rest of the course.

Fundamental Concepts

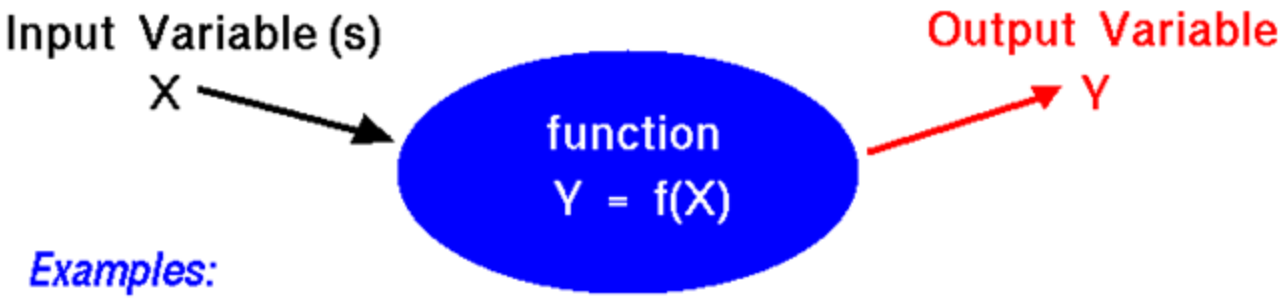
Own F&P → own the rest of the course

- Identify F&P concepts
- Learn them in a deep way
- Understand how they fit together
- Use them in your thinking about every question or problem
- Internalize them – use them to answer questions that lie beyond the scope of the course

Identify F&P

Functions

A function is a mathematical process that uniquely relates the value of one variable to the value of another variable.

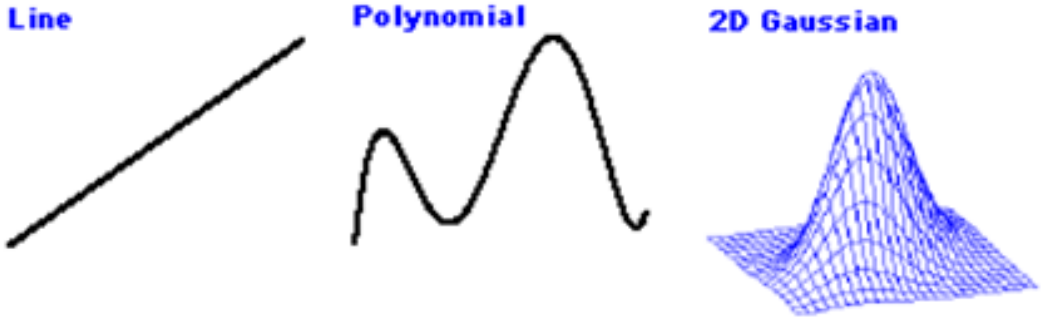


Examples:

$\sin(x)$ $\exp(x)$ e^x $x^3 + x^2 + 5x + 12$

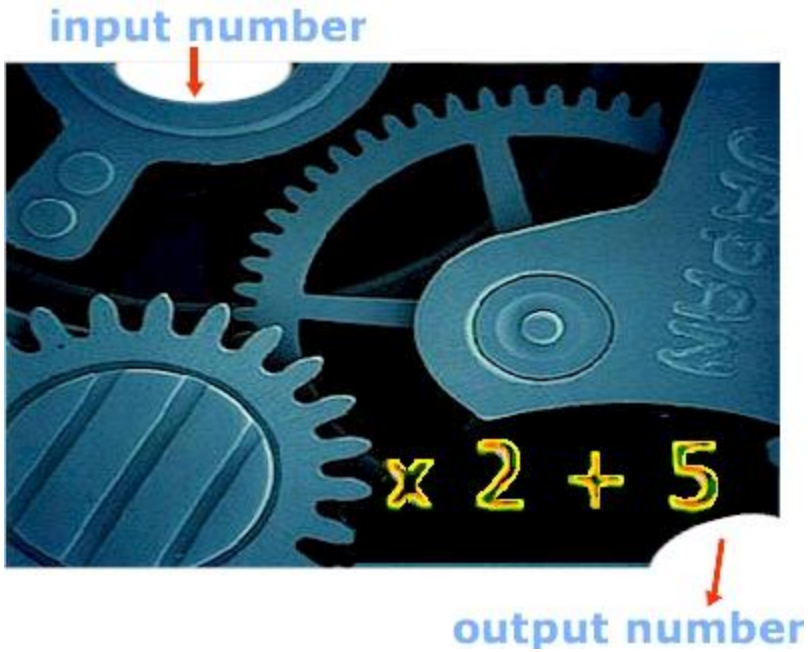
$\cos(x)$ $\ln(x)$ $\sqrt[2]{x}$ $\cosh(x)$

$\tan(x)$ $\tan^{-1}(x)$ $x!$



Fundamental Concepts

Learn F&P deeply



INPUT OUTPUT

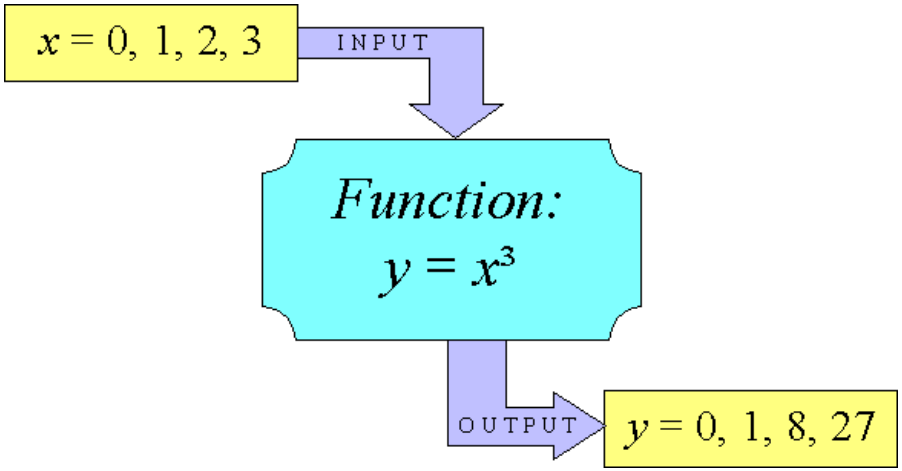
$$f(x) = x^2 - 3$$

$$g(x) = \sqrt{x+1}$$

INPUT OUTPUT

$$f(g(x)) = (g(x))^2 - 3$$

$$= (\sqrt{x+1})^2 - 3$$

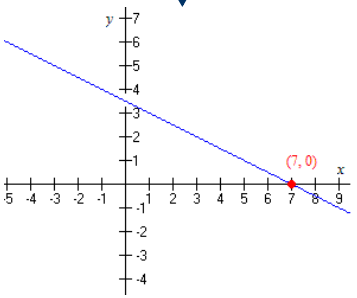


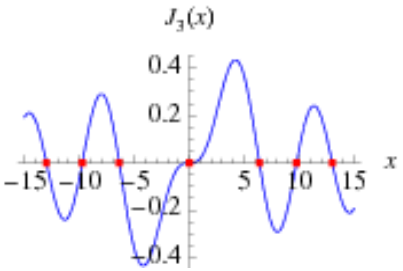
Fundamental Concepts

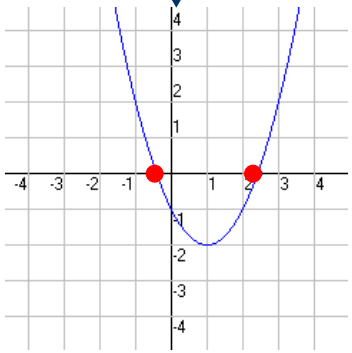
How F&P fit

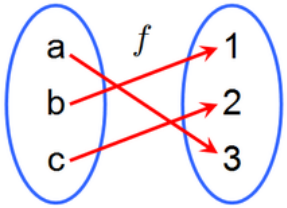
Function

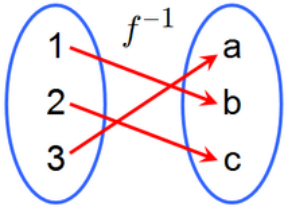
- **x-Intercepts P(x) zeros**
- **Types**
- **Inverse**











Fundamental Concepts

Why does this work?

Own F&P → own the rest of the course

- Memories are stronger when they have many associative connections
- It is much harder to recall some procedure if it is stored as a separate piece of information
- Understanding F&P concepts gives you sense of ownership and a feeling of authenticity
- Authenticity correlates with high motivation and, hence, gives you a powerful leverage to control your memories

Group Work

Choose one of the disciplines below and think of it in terms of Fundamental & Powerful concepts

- Identify F&P concepts
- Use a concept map to show how they fit together
- How can you internalize them in your life?

History, Biology, Literature, Mathematics, Physics