Section 1.1: Models, Functions and Graphs

Combining Functions

We can perform operations on functions, just like on numbers.

Function Addition

$h = f + g$ Describes the total output of two functions. For example, the Total Cost is the sum of two functions where one is the Fixed Cost and the other is Variable Cost.

Example 1

The salary of a professor at Cornell makes a yearly salary given by the following function

$S(t) = 4100t + 62,000$ dollars

after t years between 2000 and 2005.

The professor also does consulting work in which he earns

$C(t) = -10t^2 + 2500t + 550$

Construct a model for the professor's total yearly earnings. How much did he earn in 2002?

Function Subtraction

$h = f - g$ Describes the difference of the output of two functions. For example, Profit is the difference of two functions, the Revenue and the Cost.

Function Multiplication

$h = f \cdot g$ Combines two functions by multiplying. Usually used when you know the rate at which something is done.

Example 2

The price of gas in the month of December was described by

$G(x) = 0.02x + 2.98$

in dollars per gallon on the xth day of the month.

The amount of gas sold on the xth day at a gas station was

$S(x) = 2.1 + 0.4(1.1^x)$

thousand gallons.

Write a function describing how much revenue was made on the xth day. How much money was made on the 10th of December?

Function Division

$h = \frac{f}{g}$ Describes the ratio of two functions. Usually used to find the averages or percentages.

Example 3

The number of children going to see a movie on its xth day of release is given by

$C(x) = 320 - 20x$

The total number of people going to the movie on the xth day of release is given by

$T(x) = 512 - 2x^2$

Find a function for what percentage of people attending the movie are children. What percentage were children on the 3rd day of release?

Fucntion Composition

$h(x) = (g \circ f)(x) = g(f(x))$ This is used to when the output of one function is the input of another function.

Example 4

$f(t) = 3t^2$; $t(p) = 2 + p$

$f(t(p)) =$

Example 5

The contamination in a lake can be modeled as $C(p) = 2\sqrt{p}$, parts per million when the population is p people. The population of the community is given by $p(t) = t^2 + 2$ thousand people t years after 2000. Find a function that gives the lake contamination as a function of time. What is the contamination of the lake after 5 years?