

MA 160
Section 1.2 Combining Functions

A company's **profit function** is defined as revenue minus cost.

1. A company's annual revenue, in millions of dollars, is given by the function $R(t) = 0.2t^2 + 3t + 5$, where t is defined as years since 2000. The company's annual cost, in millions of dollars, is given by the function $C(t) = 4t + 9$.

a) Find and simplify a formula for the profit function $P(t)$.

Profit = Revenue - Cost

$$= 0.2t^2 + 3t + 5 - (4t + 9) = 0.2t^2 - t - 4$$

b) Compute and interpret $P(7)$.

$$P(7) = 0.2(7)^2 - 7 - 4 = ?$$

The profit in 2007 was _____ million dollars

2. Let $f(x) = x^2$. The function $g(x)$ is unknown. Find

a) $f(6)$	b) $f(-6)$	c) $f(\text{☺})$	d) $f(x-3)$	e) $f(g(x))$
$f(6) = 6^2 = 36$	$(-6)^2 = 36$	☺^2	$(x-3)^2 = x^2 - 6x + 9$	→ unknown

3. Let $f(x) = \sqrt{x}$ and let $g(x) = x^2 + 1$. Find

a) $f(25)$	b) $f(-25)$	c) $f(\text{☺})$	d) $f(x-3)$	e) $f(g(x)) = \sqrt{x^2 + 1}$
$f(25) = \sqrt{25} = 5$	$f(-25) = \sqrt{-25}$ No Real solution	$= \sqrt{\text{☺}}$	$= \sqrt{x-3}$	

Given two functions f and g , the **composition** of f and g is $h(x) = f(g(x))$. This is what you just did in question 3, part e).

4. Suppose $L(t) = (2t - 1)^3$. Can you **decompose** $L(t)$ by writing it as composition of two functions f and g ? Which function would you consider the "inside" function and which function would you consider the "outside" function?

$$f(t) = t^3 ; g(t) = 2t - 1$$