115 ~ 2013/01/25

$$R(x) - C(x) = P(x)$$
$$= (R - C)(x)$$

Note
$$f+g = (f+g)(x) = f(x) + g(x)$$
$$f-g = (f-g)(x) = f(x) - g(x)$$
$$fg = (fg)(x) = f(x)\,g(x)$$
$$f/g = (f/g)(x) = f(x)/g(x)$$

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composition

$$(f \circ g)(x) = f(g(x))$$

$$\begin{tikzcd}
x \arrow[r, "f"] \arrow[rr, bend right] & f(x) \arrow[r, "g"] & g[f(x)] = h(x)
\end{tikzcd}$$

$$h(x) = g \circ f = g(f(x))$$

<u>EX</u>

$$f(x) = x^2 - 1 \qquad g(x) = \sqrt{x} + 1 \qquad h(x) = \sqrt{x+1}$$
$$f(\_) = (\ \ )^2 - 1$$

$$(f \circ g)(x) = f(g(x)) = (\underline{g(x)})^2 - 1$$
$$= (\underline{\sqrt{x} + 1})^2 - 1$$
$$= (\sqrt{x} + 1)(\sqrt{x} + 1) - 1$$
$$= (\sqrt{x})^2 + \sqrt{x} + \sqrt{x} + 1 - 1$$
$$= x + 2\sqrt{x}$$

$$(h \circ f)(x) = h(f(x)) = \sqrt{(\underline{f(x)}) + 1}$$
$$= \sqrt{(\underline{x^2 - 1}) + 1}$$
$$= \sqrt{x^2 - 1 + 1}$$
$$= \sqrt{x^2}$$
$$= x$$

Domain of $f(x) = (x+3)^{7/2} = \sqrt{x+3}^{\,7}$

if the inside $(x+3)$ is negative, then we can't take the square root, so we need $x+3$ to be larger than or equal zero to be in the domain

$$x+3 \geq 0 \quad \Rightarrow \quad x \geq -3$$

note, we can also determine this by considering the transformations involved

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graph $g(x) = \begin{cases} x-3 & x \geq 3 \\ -x+3 & x < 3 \end{cases}$ using color 1 / using color 2

x	$g(x)$
-2	5
0	3
2	1
3	0
4	1
6	3