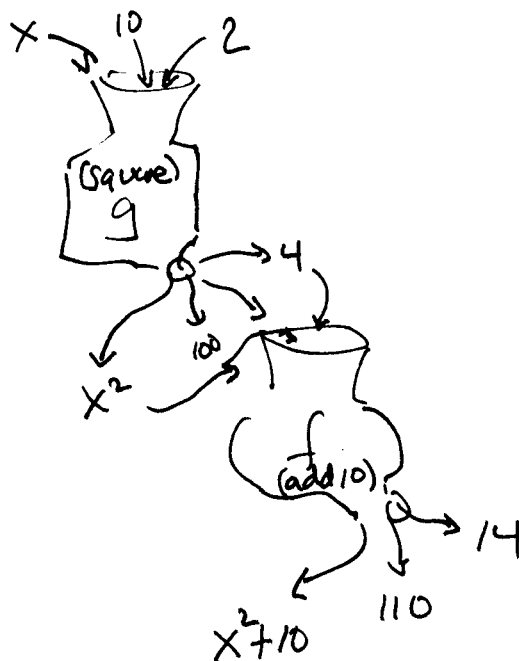


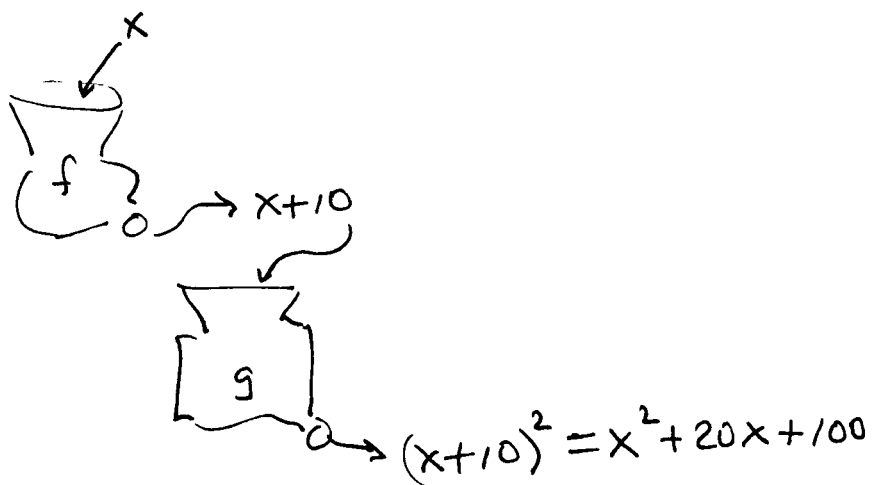
2.8 Composition of functions

ex: $g(x) = x^2$ $f(x) = x + 10$



$$f(g(x)) = f(x^2) = x^2 + 10$$

ex:



Defn

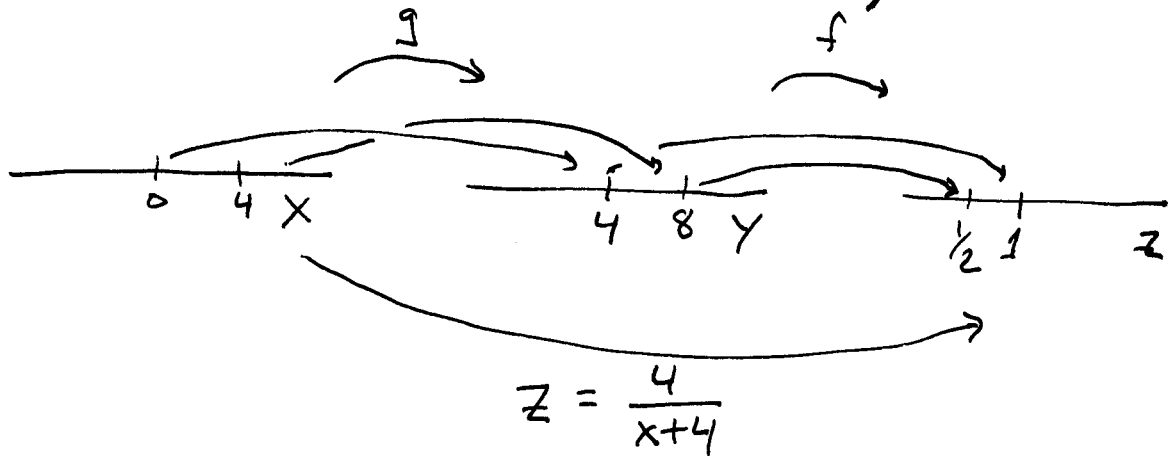
Define $f \circ g$ for functions f and g by $(f \circ g)(x) = f(g(x))$.

(2)

[Fine print:] The domain of $f \circ g$ is a subset of the domain of g such that $g(x)$ is in the domain of f .

ex.: $f: y = x + 4$

and $g: z = \frac{4}{x}$



86) $f(x) = \sqrt{x}$

$g(x) = \frac{3}{x+6}$

Find $(g \circ f)(x) = g(f(x)) = g(\sqrt{x}) = \frac{3}{\sqrt{x}+6}$

"Difference quotients"

$$= \frac{f(x+h) - f(x)}{h}$$

example: $f(x) = x^2$
~~Supo~~

(Step 1) $f(x+h) = (x+h)^2 = x^2 + 2xh + h^2$

(Step 2) $f(x+h) - f(x) = x^2 + 2xh + h^2 - x^2$
 $= 2xh + h^2$
 $= h(2x+h)$

(Step 3) $\frac{f(x+h) - f(x)}{h} = \frac{h(2x+h)}{h}$
 $= 2x+h$