

More on Functions: Composition

eg $f(x) = x^2$ then $f(3) = (3)^2 = 9$
 $f(-2) = (-2)^2 = 4 \dots$

You can sub "things" in for x other than #!

eg $f(x) = x^2$ then $f(t) = t^2$, $f(u) = u^2$, ...
 $f(k-1) = (k-1)^2 \rightarrow$ Composition!

Placing a function into another function!
ie, $f(g(x))$ or $(f \circ g)(x)$

eg $f(x) = x^3 - 2x$ $g(x) = 3 - 5x$
 $\Rightarrow f(g(x)) = f(3 - 5x) = (3 - 5x)^3 - 2(3 - 5x)$

Trick: Replace all x 's with ().

eg $f(x) = \sin(x^2) - \sqrt{x}$ $g(x) = \ln(x-3) + x^5 - 6x$
Find $f(g(x))$ and $g(f(x))$ and $f(f(x))$.

$f(\) = \sin(\)^2 - \sqrt{\ } , g(\) = \ln(\) - 3 + (\)^5 - 6(\)$

a) $f(g(x)) = f(\ln(x-3) + x^5 - 6x)$
 $= \sin(\ln(x-3) + x^5 - 6x)^2 - \sqrt{\ln(x-3) + x^5 - 6x}$

b) $g(f(x)) = g(\sin(x^2) - \sqrt{x}) = \ln(\sin(x^2) - \sqrt{x} - 3) + (\sin(x^2) - \sqrt{x})^5 - 6(\sin(x^2) - \sqrt{x})$

c) $f(f(x)) = f(\sin(x^2) - \sqrt{x}) = \sin(\sin(x^2) - \sqrt{x})^2 - \sqrt{\sin(x^2) - \sqrt{x}}$