20181015b MT105A 03 Definition of derivatives

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### Considering an instantaneous change h

delta y == f(x+h) - f(x)  
delta x == (x+h) - x f’(x) == delta y / delta x == (f(x+h) - f(x)) / h

library(mosaic)  
library(Ryacas)

### Suppose f(x) == x^2; find f’(x) using the first principle

x = Sym('x')  
h = Sym('h')  
fx = makeFun(x^2~x)  
f.x = Simplify((Expand(fx(x+h))-fx(x))/h)  
f.x

## expression(2 \* x + h)

# Verifying the answer  
deriv(x^2,x)

## expression(2 \* x)