Key Concepts

- Derivatives
  Derivatives represent a change of a certain function f(x)
- Examples
  Let f(x) represent a position of an object. Then the derivative, the change of the position of the object would be the velocity.
- Denoted: f'(x) or $\frac{dy}{dx}$
- Definition of Derivatives
$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$
- **Remember** Cases where you still have to do limits
  $\frac{0}{0}, \pm\frac{\infty}{\infty}$
- Example: Using the definition find the derivative of x^2

$$\lim_{h\to 0} \frac{(x+h)^2-x^2}{h} = \lim_{h\to 0} 2x+h = 2x$$

Practice Problems

1. Using the definition of a derivative, find the derivative of the following functions

   (a) $f(x) = x^3$ at x = 3

   b) $f(x) = \frac{1}{4x+2}$

   c) $f(x) = x^2 - 5x$

2. The quantity in kilogram of strawberry that is sold by a supermarket at a price of Z dollars per kilogram is represented as P = f(Z)

   a) What would the derivative, f'(9) represent? What would the units be?

   b) Is f'(9) positive or negative? Explain your reasonings

3. Given the table where h(x) = f(x)g(x), find h'(3)

f(x)	g(x)	f'(x)	g'(x)
-1	2	-5	1