18 September 2014 The Derivative at a Point

(1) Use the definition

$$f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

to compute the derivative of the given function at x = a. (a)  $f(x) = x - x^3$  for a = 1

(b) 
$$g(x) = \frac{2x+1}{x+2}$$
 for  $a = 1$ 

(c) 
$$h(x) = \sqrt{x+3}$$
 for  $a = 6$ 

(2) Use the definition

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

to compute the derivative of the given function at x = a. (a)  $f(x) = 3x^2 - 4x + 1$  for a = 3

(b) g(x) = 1/x for arbitrary *a* (so your answer should involve *a*).

(c)  $h(x) = 1/x^2$  for arbitrary a

(3) The limit

$$\lim_{x \to 1} \frac{x^4 + x - 2}{x - 1}$$

represents the derivative of some function f at some point a. What are f and a?