$$f(x)=x^2$$

$$\downarrow$$

$$f'(2)=\lim_{h\to 0}\frac{f(2+h)-f(2)}{h}$$

$$=\lim_{h\to 0}\frac{(2+h)^2-4}{h}$$

$$=\lim_{h\to 0}\frac{\left[h^2+4h+4\right]-4}{h}$$

$$=\lim_{h\to 0}\frac{h^2+4h}{h}$$

$$=\lim_{h\to 0}h+4$$

$$=4$$

$$f(x)=x^2$$

$$\downarrow$$

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

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

$$=\lim_{h\to 0}\frac{\left[x^2+2xh+h^2\right]-x^2}{h}$$

$$=\lim_{h\to 0}\frac{h^2+2xh}{h}$$

$$=\lim_{h\to 0}h+2x$$

$$=2x$$

$$f'(x)=2x$$

$$f'(2)=2(2)=4$$

$$f'(3)=2(3)=6$$