4. find $f'(x)$ using the limit definition of the derivative.

$$f(x) = 7x^2 + 11x + 10$$

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

$$= \frac{7(x+h)^2 + 11(x+h) + 10 - 7x^2 + 11x + 10}{h}$$

$$= \frac{7(x^2 + 2xh + h^2) + 11x + 11h + 10 - 7x^2 + 11x + 10}{h}$$

$$= \frac{7x^2 + 14xh + 7h^2 + 11x + 11h + 10 - f(x)}{h}$$

$$= \frac{7x^2 + 14xh + 7h^2 + 11x + 11h + 10 - 7x^2 + 11x + 10}{h}$$

$$= \frac{14xh + 7h^2 + 11h}{h} \rightarrow \frac{h(14x + 7h + 11)}{h}$$

$$= 14x + 7h + 11$$

$$f'(x) = \lim_{h \to 0} 14x + 7h + 11$$

$$= 14x + 11$$