

(1) [5] Determine

$$\lim_{x \rightarrow -\infty} (x^4 + x^5)$$

$$= \lim_{x \rightarrow -\infty} x^5 \left( \underbrace{\frac{1}{x} + 1}_{\rightarrow 1} \right)$$

$$= \boxed{-\infty}$$

(2) [10] Use the definition of the derivative to find the derivative of

$$G(t) = \frac{4t}{t+1}$$

$$G'(t) = \lim_{h \rightarrow 0} \frac{G(t+h) - G(t)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{1}{h} \left[ \frac{4(t+h)}{t+h+1} - \frac{4t}{t+1} \right]$$

$$= \lim_{h \rightarrow 0} \frac{1}{h} \left[ \frac{(4t+4h)(t+1) - 4t(t+h+1)}{(t+h+1)(t+1)} \right]$$

$$= \lim_{h \rightarrow 0} \frac{1}{h} \left[ \frac{\cancel{4t^2} + 4t + \cancel{4ht} + 4h - \cancel{4t^2} - \cancel{4ht} - 4t}{(t+h+1)(t+1)} \right]$$

$$= \lim_{h \rightarrow 0} \frac{1}{\cancel{h}} \frac{4h}{(t+h+1)(t+1)}$$

$$= \boxed{\frac{4}{(t+1)^2}}$$