(1) [5]   Determine

$$\lim_{x \to -\infty} (x^3 + x^4)$$

$$= \lim_{x \to -\infty} x^4 \left(\frac{1}{x} + 1 \right)$$

$$\underbrace{\qquad}_{\to 1}$$

$$= \boxed{+\infty}$$

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

$$g(x) = \sqrt{1+2x}$$

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

$$= \lim_{h \to 0} \frac{\sqrt{1+2(x+h)} - \sqrt{1+2x}}{h} \cdot \frac{\sqrt{1+2(x+h)} + \sqrt{1+2x}}{\sqrt{1+2(x+h)} + \sqrt{1+2x}}$$

$$= \lim_{h \to 0} \frac{1+2(x+h) - (1+2x)}{h(\sqrt{1+2(x+h)} + \sqrt{1+2x})}$$

$$= \lim_{h \to 0} \frac{2h}{h(\sqrt{1+2(x+h)} + \sqrt{1+2x})}$$

$$= \lim_{h \to 0} \frac{2}{2\sqrt{1+2x}}$$

$$= \boxed{\frac{1}{\sqrt{1+2x}}}$$