114. (a) $\lim_{x\to\infty} \dfrac{f(x)}{g(x)} = \lim_{x\to\infty} \dfrac{x + x\sin x}{x^2} = \lim_{x\to\infty} \dfrac{1 + \sin x}{x} = 0$

$\left(\text{Because } 0 \le 1 + \sin x \le 2, \text{ and } x \to \infty\right)$

(b) $\lim_{x\to\infty} f(x) = \lim_{x\to\infty} x(1 + \sin x) = \infty$

$\lim_{x\to\infty} g(x) = \lim_{x\to\infty} x^2 = \infty$

(c) $\lim_{x\to\infty} \dfrac{f'(x)}{g'(x)} = \lim_{x\to\infty} \dfrac{1 + \sin x + x\cos x}{2x}$ undefined

(d) No. If $\lim_{x\to\infty} \dfrac{f'(x)}{g'(x)}$ does not exist, then you cannot assume anything about $\lim_{x\to\infty} \dfrac{f(x)}{g(x)}$.