

(1) [5] Determine

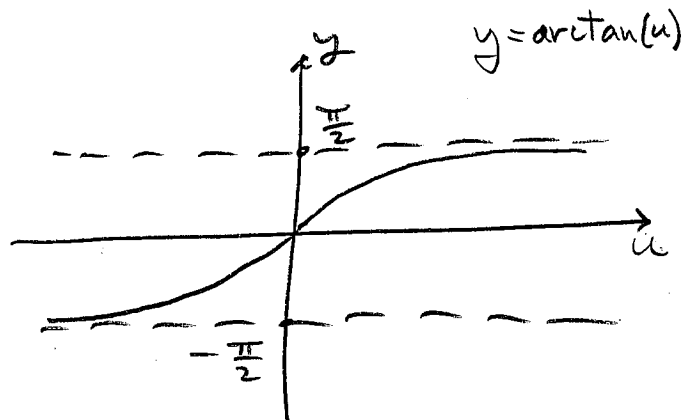
$$\lim_{x \rightarrow \infty} \arctan(e^x)$$

As  $x \rightarrow \infty$ ,  $e^x \rightarrow \infty$ .

$$\therefore \lim_{x \rightarrow \infty} \arctan(e^x)$$

$$= \lim_{u \rightarrow \infty} \arctan(u)$$

$$= \boxed{\frac{\pi}{2}}$$



(2) [5] Determine

$$\lim_{x \rightarrow -\infty} \tanh(x)$$

$$= \lim_{x \rightarrow -\infty} \frac{(e^x - e^{-x}) \cdot e^x}{(e^x + e^{-x}) \cdot e^x}$$

$$= \lim_{x \rightarrow -\infty} \frac{e^{2x} - 1}{e^{2x} + 1}$$

$$= \frac{-1}{1}$$

$$= \boxed{-1}$$

(2) [5] Determine

$$\lim_{x \rightarrow \infty} \frac{x}{\ln(1+2e^x)} \sim \frac{\infty}{\infty}$$

$$\stackrel{H}{=} \lim_{x \rightarrow \infty} \frac{1}{\frac{1}{1+2e^x} \cdot (2e^x)}$$

$$= \lim_{x \rightarrow \infty} \frac{1+2e^x}{2e^x} \sim \frac{\infty}{\infty}$$

$$\stackrel{H}{=} \lim_{x \rightarrow \infty} \frac{2e^x}{2e^x}$$

$$= \boxed{1}$$