$$\lim_{h\to 0} \frac{a^{x+h} - a^x}{h}$$

$$= \log_a \left(\frac{a^{x+h} - a^x}{h} \right)$$

$$= \frac{a^x a^h - a^x}{h}$$

$$= a^x \left(\frac{a^h - 1}{h} \right)$$

so, all that's left is to find a s.t. $\lim_{h\to 0} \left[\frac{a^h - 1}{h} \right] = 1$

so $a^h - 1 = h$

$a^h = h + 1$

$a = (h+1)^{1/h}$ $\lim_{h\to 0}$ ...

✓