Write it as a quotient with e^{-x} as denominator. It then becomes an "$\frac{0}{0}$ indeterminate form" and we can use L'Hopital's rule:

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

$$= \lim_{x\to+\infty} \frac{\left(\frac{1}{1+\frac{1}{x}}\right)\left(-\frac{1}{x^2}\right)}{-e^{-x}} = \lim_{x\to+\infty} \frac{e^x}{x^2+x}$$ (an $\frac{\infty}{\infty}$ indeterminate form)

after simplifying

$$= \lim_{x\to\infty} \frac{e^x}{2x+1} = \lim_{x\to\infty} \frac{e^x}{2} = +\infty$$ (after applying L'Hopital's rule 2 more times).

$\frac{\infty}{\infty}$ form

(e) $\lim_{x\to+\infty} xe^{\frac{1}{x}} - x$. As $x \to +\infty$, $e^{\frac{1}{x}} \to e^0 = 1$, so this is an "$\infty - \infty$" indeterminate form.

Rewrite it as a quotient: $= \lim_{x\to+\infty} \dfrac{e^{\frac{1}{x}} - 1}{1/x}$

This is a $\frac{0}{0}$ indeterminate form so we can use L'Hopital's rule and get

$$\lim_{x\to+\infty} (xe^{\frac{1}{x}} - x) = \lim_{x\to\infty} \frac{(e^{\frac{1}{x}})(-\frac{1}{x^2})}{(-\frac{1}{x^2})}$$

$$= \lim_{x\to\infty} e^{\frac{1}{x}} = e^0 = 1.$$