Now

$$P_\beta \ln \frac{P_\beta}{P_\alpha} \geq P_\beta - P_\alpha$$

$$x \ln \frac{x}{y} \geq x - y \qquad \ln \frac{x}{y} \geq 1 - \frac{y}{x}$$

$$x \ln x - x \ln y \geq x - y \qquad \frac{x}{y} \geq e^{1 - \frac{y}{x}}$$

$$x (\ln x - \ln y) \geq x - y$$

$$\alpha \geq e^{1 - \frac{1}{\alpha}} \qquad \frac{\alpha}{e} \geq e^{-\frac{1}{\alpha}}$$

clearly true as $\alpha \to 0+$

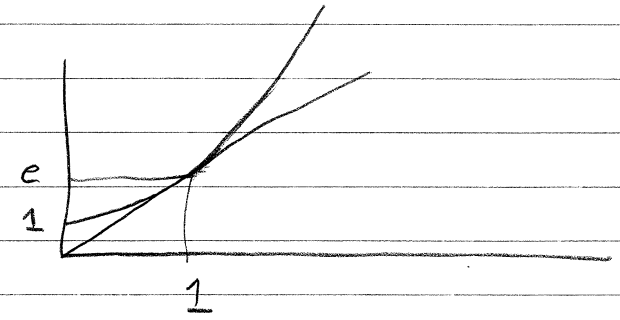
if $\alpha > 1$

$$\frac{\alpha}{e} \geq \frac{1}{e^{\frac{1}{\alpha}}} = \frac{1}{\quad} \qquad x = \frac{1}{\alpha}$$

$$\frac{1}{xe} \geq \frac{1}{e^x} \qquad e^x \geq ex$$

$\alpha = \frac{1}{x}$ $\quad x = \frac{1}{\alpha}$

$$\alpha = \frac{P_\beta}{P_\alpha}$$



if $x = \frac{P_\alpha}{P_\beta}$

$$e^{P_\alpha/P_\beta} \geq \frac{P_\alpha}{P_\beta} e \qquad P_\alpha \geq P_\beta + P_\beta \ln \frac{P_\alpha}{P_\beta}$$

$$\frac{P_\alpha}{P_\beta} \geq 1 + \ln \frac{P_\alpha}{P_\beta} \qquad P_\beta \ln \frac{P_\beta}{P_\alpha} \geq P_\beta - P_\alpha$$