8. [7 points] Consider the integral

$$\int_{1}^{\infty} \frac{e^{rx}}{x} \, dx,$$

where r is a constant.

a. [3 points] Show that this integral converges for r < 0. Show all work and indicate any convergence tests used.

b. [4 points] Show that the integral diverges for $r \ge 0$. Show all work and indicate any convergence tests used.