1. Show that each improper integral converges. Then find a definite integral that approximates the improper integral within 10^{-10} of its actual value.

   (a) $\displaystyle\int_1^\infty \frac{1}{e^x + 2}\, dx$

   (b) $\displaystyle\int_2^\infty \frac{2}{2x^4 + \pi}\, dx$

2. Show that $\displaystyle\int_2^\infty \frac{1}{e^x + 3x^2}\, dx$ converges, and approximate its value accurate within 0.0001.