1. [14 points] Determine if the following integrals converge or diverge. If the integral converges, circle the word "converges" and give the **exact value** (i.e. no decimal approximations). If the integral diverges, circle "diverges". In either case, **you must give full evidence supporting your answer, showing all your work and indicating any theorems about improper integrals you use**. Any direct evaluation of integrals must be done **without using a calculator**.

a. [7 points] $\displaystyle\int_1^\infty \frac{x}{e^{ax^2+1}}\,dx$, where $a > 0$ is a constant

Converges   **Diverges**

b. [7 points] $\displaystyle\int_2^\infty \frac{x + \sin x}{x^2}\,dx$

Converges   **Diverges**