

No calculators are allowed for this quiz. You must show all work to receive credit.

1. (2 points) Find a value of a such that $\int_1^4 \frac{dx}{x^2 - ax}$ is an improper integral. Briefly explain.

2. (4 points each) Evaluate the following integrals.

(a) $\int_1^e \frac{dx}{x \ln(x)^2}$

(b) $\int_3^\infty \frac{dx}{\sqrt{x-3}}$

3. (4 points each) Determine if the following integrals converge or diverge.

(a) $\int_5^\infty \frac{dx}{x^3 + 3\sqrt{\ln(x)}}$

(b) $\int_0^2 \frac{dx}{x^5 + x^3}$

4. (4 points) Find a value of a such that $\int_1^a \frac{1}{e^{x+2\sin x}} dx$ approximates $\int_1^\infty \frac{1}{e^{x+2\sin x}} dx$ to within $\frac{1}{1000}$.

(EC) Give an example of a function $f(x)$ such that $f(x)$ has a vertical asymptote at $x = -3$ but yet $\int_{-\infty}^\infty f(x) dx$ converges.