

Collaborators (if any):

Due Tuesday, February 6th at the beginning of class. Submit your work on additional paper, treating this page as a cover sheet. You may use technology and work with with other students. If you work with others, please list their names above.

1. For which values of p does $\int_e^\infty \frac{dx}{x(\ln x)^p}$ converge/diverge? Find the value of the improper integral when it is convergent.
2. For what values of p does the improper integral $\int_0^1 \frac{dx}{x^p}$ converge?
3. First, show that $\int_0^\infty \frac{dx}{x^3+1}$ converges by comparison. Second, find the value of the improper integral. (You should get $\frac{2\pi}{3\sqrt{3}}$).
4. Find the value of C for which the following improper integral converges and evaluate the integral for this value of C :

$$\int_0^\infty \left(\frac{1}{\sqrt{x^2+4}} - \frac{C}{x+2} \right) dx.$$

[Note that the integral of each summand separately is divergent, but the right choice of C gives “cancellation” and a convergent integral.]