

Improper Integrals

Prove convergence or divergence of the following improper integrals.

1. $\int_2^{\infty} \frac{1}{x^3-1} dx.$
2. $\int_2^{\infty} \frac{1}{x^{3/2}+1} dx.$
3. $\int_0^{\infty} \frac{1}{e^x+1} dx.$
4. $\int_0^{\infty} \frac{e^{2x}}{e^x+1} dx.$
5. $\int_0^{\infty} \frac{x^2-x}{x^3+1} dx.$
6. $\int_0^{\infty} \frac{x}{(x+1)^3} dx.$
7. $\int_2^{\infty} \frac{x}{\sqrt{x^3+1}} dx.$
8. $\int_1^{\infty} \frac{\sqrt{x}+1}{x^2} dx.$
9. $\int_2^{\infty} \frac{x}{\sqrt{e^x+x}} dx.$
10. $\int_2^{\infty} \frac{1}{x \ln x} dx.$
11. $\int_2^{\infty} \frac{1}{x(\ln x)^2} dx.$
12. For which p does $\int_2^{\infty} \frac{1}{x(\ln x)^p} dx$ converge?
13. $\int_1^{\infty} \frac{\sin^2 t}{t^2} dt.$
14. Show that if $p > 1$ then $\int_1^{\infty} \frac{\sin^2 t}{t^p} dt$ converges.
15. $\int_0^1 \frac{1}{t^2} dt.$
16. $\int_0^1 \frac{1}{\sqrt{t+t^4}} dt.$
17. $\int_0^{\pi/2} \tan x dx.$
18. $\int_0^1 \frac{e^{-x}}{x+x^2} dx.$
19. $\int_0^1 \ln x dx.$
20. $\int_1^2 \frac{1}{\sqrt{2-t}} dt.$