

Improper Integrals

1. Determine whether the improper integral $\int_0^{\infty} 1/x^3 dx$ is convergent or divergent. If it's convergent what is the value of the integral?
2. Determine whether the improper integral $\int_0^{\infty} 1/x dx$ is convergent or divergent. If it's convergent what is the value of the integral?
3. For each positive value of p , determine whether the improper integral $\int_0^1 \frac{1}{x^p} x dx$ is convergent or divergent. If it's convergent what is the value of the integral?
4. Determine whether the improper integral $\int_1^{\infty} \cos(x) dx$ is convergent or divergent. If it's convergent what is the value of the integral?

5. Determine whether the improper integral $\int_0^{\infty} x e^{-x} dx$ is convergent or divergent. If it's convergent what is the value of the integral?

6. Determine whether the improper integral $\int_{-\infty}^{\infty} \frac{1}{x^2+1} dx$ is convergent or divergent. If it's convergent what is the value of the integral?

7. Determine whether the improper integral $\int_1^3 \frac{1}{\sqrt{x-1}} dx$ is convergent or divergent? If it's convergent what is the value of the integral?

8. Determine whether the improper integral $\int_0^{200} \frac{1}{(x-100)^2} dx$ is convergent or divergent?

9. Is the integral $\int_0^{\frac{\pi}{4}} \tan(x)x \, dx$ improper? How about $\int_0^{\frac{\pi}{2}} \tan(x)x \, dx$? If it's convergent, what is the value of the integral?

10. Determine whether the improper integral $\int_0^1 \ln(x)x \, dx$ is convergent or divergent? If it's convergent what is the value of the integral?

11. Is the improper integral $\int_1^{\infty} e^{-x^2} \, dx$ convergent? How about $\int_0^{\infty} e^{-x^2} \, dx$?

12. Is the improper integral $\int_1^{\infty} \frac{2+\sin(x)}{x} \, dx$ convergent? How about $\int_1^{\infty} \frac{2+\sin(x)}{x^2} \, dx$?