

1. Classify each of the integrals as proper or improper integrals. Give a clear reason for each.

a. $\int_5^{\infty} \frac{dx}{(x-2)^2}$

b. $\int_2^5 \frac{dx}{(x-2)^2}$

c. $\int_2^5 \frac{dx}{(x-2)^2}$

d. $\int_3^5 \frac{dx}{(x-2)^2}$

2. Use the fact $\int_0^{\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$ to determine if the following integrals converge or diverge. If the integral converges, find the exact value.

a. $\int_{-\infty}^{\infty} e^{-x^2} dx$

b. $\int_{-\infty}^0 e^{-x^2} dx$

c. $\int_0^{\infty} x^2 e^{-x^2} dx$

d. $\int_{-\infty}^0 x^2 e^{-x^2} dx$

e. $\int_m^{\infty} e^{-\left(\frac{t-m}{k}\right)^2} dt$