

MATH 31B: Week 6 Discussion

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Question 1. Determine whether the following improper integrals converge or diverge. If they converge, what do they converge to?

(a) $\int_1^{\infty} x^3 dx$

(b) $\int_0^2 x^2 dx$

(c) $\int_1^2 \frac{1}{x \ln(x)} dx$

Question 2. Use the comparison test to determine whether the following integrals converge or diverge.

(a) $\int_1^{\infty} \frac{dx}{\sqrt{x^4 + 3}}$

(b) $\int_0^1 \frac{dx}{x^4 + \sqrt{x}}$

Question 3. Compute the arclength of $y = \left(\frac{x}{2}\right)^4 + \frac{1}{2x^2}$ over the interval $[1, 4]$.

Question 4. (More Challenging) Compute the arc length of $y = \ln\left(\frac{e^x + 1}{e^x - 1}\right)$ over the interval $[1, 3]$.