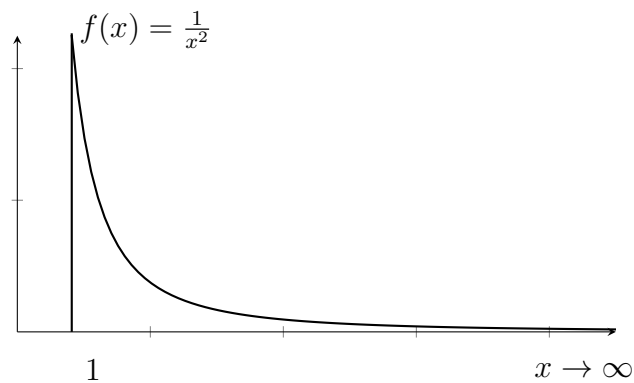


Group members:

Warm-up: here's an example of a region with "infinite length" but finite area:



Write down an improper integral that describes the area under the graph above:

area =

How would you evaluate this expression?

Problem 1. Determine whether the following integrals converge or diverge. Also, find the values of any that converge.

(a) $\int_{-\infty}^{\pi} \cos(x) dx$

$$(b) \int_2^{\infty} \frac{1}{x \ln(x)} dx$$

$$(c) \int_0^{\infty} x e^{-x} dx$$

$$(d) \int_0^2 \frac{1}{\sqrt[3]{x-1}} dx$$

(e) $\int_{-\infty}^{\infty} \frac{1}{4+x^2} dx$

Problem 2. For what values of p does $\int_1^{\infty} \frac{1}{x^p} dx$ converge?

Problem 3. Find the volume of the solid obtained by rotating the area bounded by $x = 1$, $y = \frac{1}{x}$, and the x -axis around the x -axis.

Problem 4. There is exactly one constant A for which $\int_0^\infty \left(\frac{2x}{1+x^2} + \frac{A}{x+1} \right) dx$ converges. Find it and evaluate the integral for that constant.