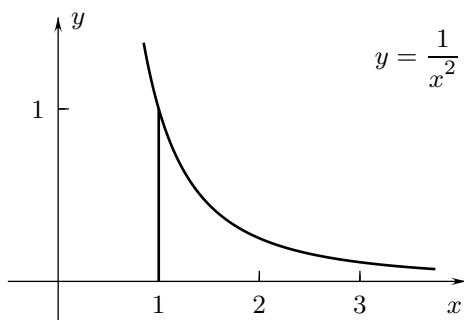


## Math 20B. Lecture Examples.

### Section 7.7. Improper integrals<sup>†</sup>

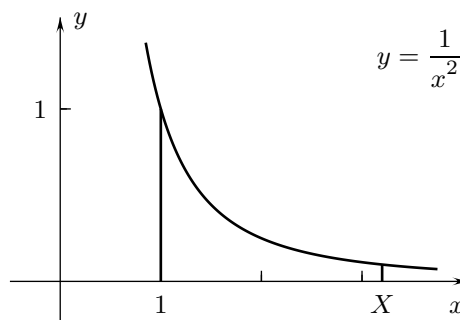
**Example 1** Find the area of the unbounded region between  $y = x^{-2}$  and the x-axis for  $x \geq 1$ .

**Answer:** Figures A1a and A1b • [Area] = 1



$$[\text{Area}] = \int_1^{\infty} x^{-2} dx$$

Figure A1a

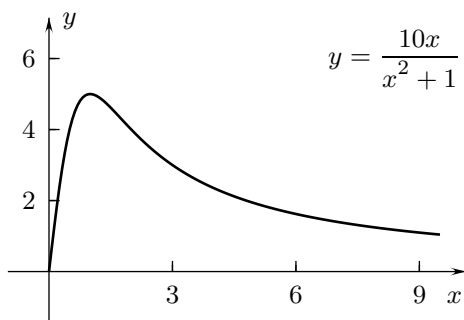


$$[\text{Area}] = \int_1^X x^{-2} dx$$

Figure A1b

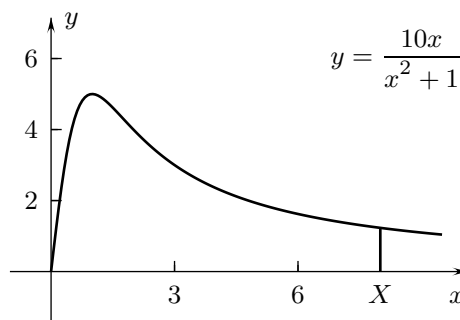
**Example 2** What the area of the unbounded region between  $y = \frac{10x}{x^2 + 1}$  and the x-axis for  $x \geq 0$ ?

**Answer:** Figures A2a and A2b • [Area] =  $\infty$



$$[\text{Area}] = \int_0^{\infty} \frac{10x}{x^2 + 1} dx$$

Figure A2a



$$[\text{Area}] = \int_0^X \frac{10x}{x^2 + 1} dx$$

Figure A2b

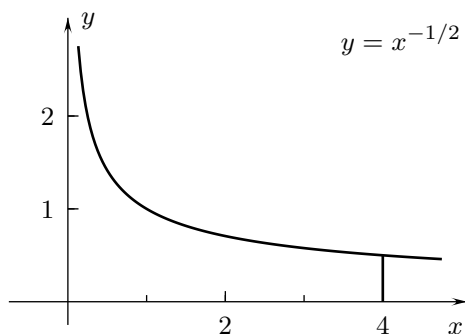
**Example 3** Does  $\int_0^{\infty} \cos x dx$  converge or diverge?

**Answer:**  $\int_0^{\infty} \cos x dx$  diverges.

<sup>†</sup>Lecture notes to accompany Section 7.7 of *Calculus, Early Transcendentals* by Rogawski.

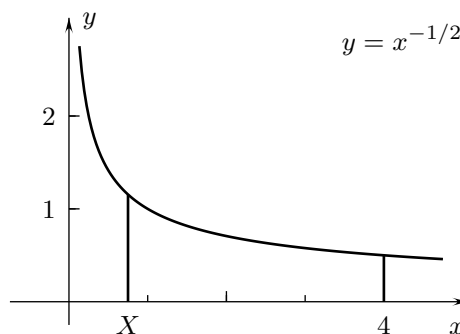
**Example 4** Find the area of the region between  $y = x^{-1/2}$  and the x-axis for  $0 < x \leq 4$ .

**Answer:** Figures A4a and A4b • [Area] = 4



$$[\text{Area}] = \int_0^4 x^{-1/2} dx$$

Figure A4a



$$[\text{Area}] = \int_X^4 x^{-1/2} dx$$

Figure A4b

**Example 5** What is the area of the unbounded region between  $y = \frac{1}{x^2 + 1}$  and the x-axis?

**Answer:** Figure A5 • [Area] =  $\pi$

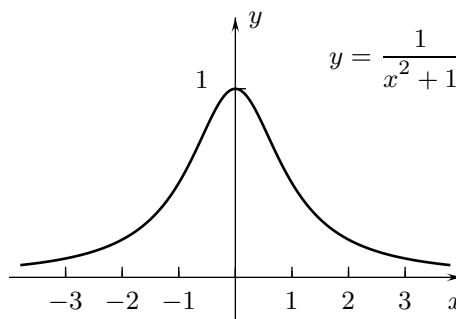


Figure A5

### Interactive Examples

Work the following Interactive Examples on Shenk's web page, <http://www.math.ucsd.edu/~ashenk/>:<sup>‡</sup>

Section 8.6: Examples 1–5

<sup>‡</sup>The chapter and section numbers on Shenk's web site refer to his calculus manuscript and not to the chapters and sections of the textbook for the course.