

Integral of $|x|$

Use the geometric definition of the definite integral to compute:

$$\int_{-1}^2 |x| dx.$$

Solution

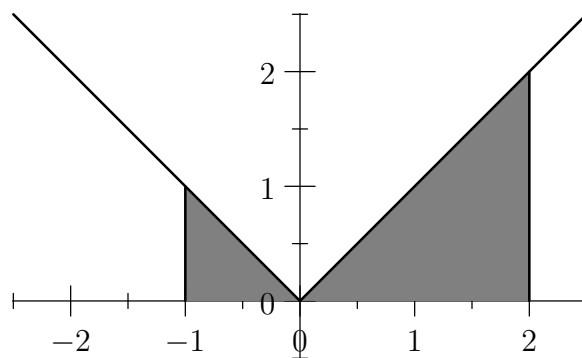


Figure 1: Area under $|x|$.

Geometrically, the value of this integral is the area between the x -axis and the graph of $y = |x|$. As illustrated in Figure 1, this is the sum of the areas of a triangle with base 1 and height 1 and a triangle with base 2 and height 2. Therefore:

$$\int_{-1}^2 |x| dx = \frac{1}{2} \cdot 1 \cdot 1 + \frac{1}{2} \cdot 2 \cdot 2 = \frac{5}{2}.$$

You might also reach this conclusion by counting the number of unit squares that fit in the shaded area.

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