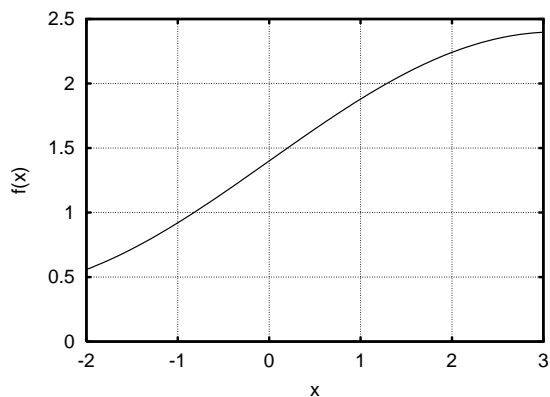


Definite Integrals and Their Interpretations



1. Estimate the following definite integrals using the $f(x)$ in the figure above:

- (a) $\int_0^2 f(x) dx$.
- (b) $\int_{-1}^0 f(x) dx$.
- (c) $\int_{-1}^2 f(x) dx$.

2. What do the above results let you conclude about

$$\int_a^b f(x) dx + \int_b^c f(x) dx = ??? \quad (1)$$

3. Estimate $\int_2^4 x^2 dx$.

4. Let $r(t)$ be the rate, in people per minute, at which people arrive at the dining hall for dinner. Consider the following integral:

$$\int_0^{30} r(t) dt . \quad (2)$$

- (a) What are the units of the above integral?
- (b) What is the practical interpretation of the above integral?

5. Electric charge is distributed non-uniformly along 2 meter length of wire. Let the density of the charge be given by $\sigma(x)$, in Coulombs per meter, where x is the position on the wire, in meters, as measured from the left end of the wire. Consider the following integral:

$$\int_0^2 \sigma(x) dx . \quad (3)$$

- (a) What are the units of the above integral?
- (b) What is the practical interpretation of the above integral?