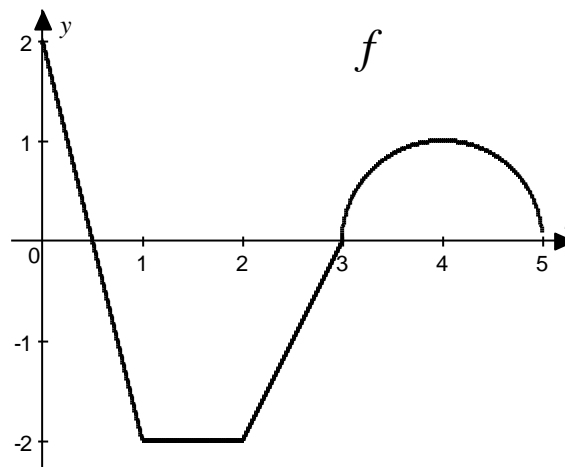# 6.1 – Average Value of a Function

Suppose a function f is continuous on the closed interval $[a, b]$. Then, the average value of f on $[a, b]$ is given by

$$f_{ave} = \frac{\int_a^b f(x)\,dx}{b-a}$$

1. Calculate the average value of f over the interval $[1, 4]$ using the graph of f provided below.

2. The function $R(t) = 100 + 100\sin(\pi t)$ describes the rate of flow of water (in liters per minute) traveling through a dam during the time interval $0 \le t \le 5$. Assuming t is measured in minutes, answer the following.

a. Use appropriate units to explain the meaning of $\int_0^5 R(t)\,dt$

b. Use appropriate units to explain the meaning of $\frac{1}{5}\int_0^5 R(t)\,dt$.

c. Calculate the average rate of flow of water traveling through the dam during the 5-minute time interval.

3. The following table gives the acceleration (in ft/s^2) of an object at various times.

t	0	4	9	11	14	21	24
$a(t)$	17	−8	−10	12	9	4	−2

a. Approximate the average acceleration of the object on the interval $0 \le t \le 24$ using a right Riemann sum with 6 subintervals and the data from the table.

b. Approximate the average acceleration of the object on the interval $0 \le t \le 11$ using trapezoids with 3 subintervals and the data from the table.