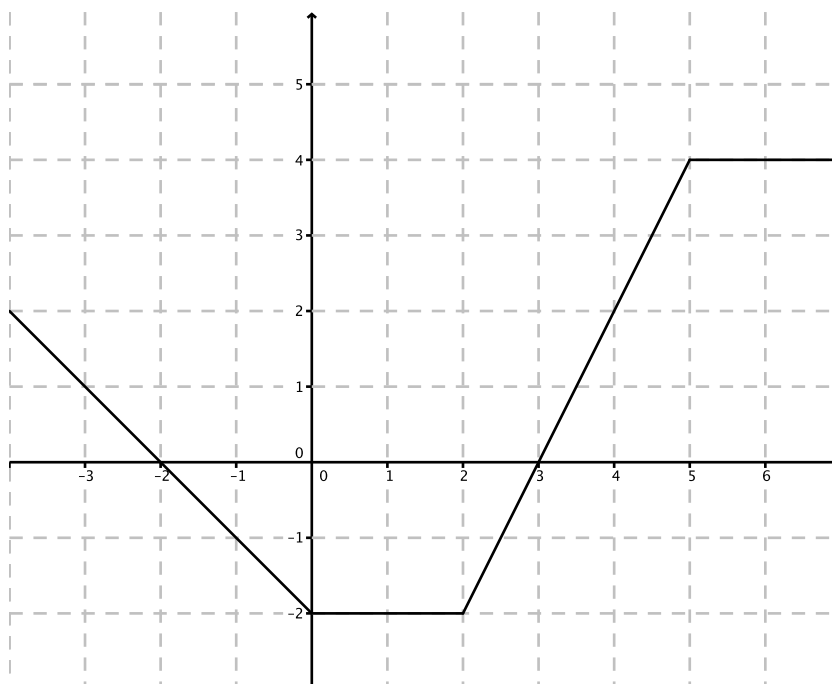


Worksheet 12

Exercise 1 Below is the graph of a function f . Compute

$$\int_{-4}^7 f(x) dx$$



Exercise 2 If $f(x) = 2x - x^2$, $0 \leq x \leq 1$, evaluate the Riemann sum with $n = 3$ (three rectangles), taking the sample points to be right endpoints. Draw first a picture of the situation (graph of the function and rectangles). Note that $f(x)$ can be written as $f(x) = 1 - (x - 1)^2$.

Exercise 3 Imagine that the graph in Exercise 1 represents the velocity $(v(t))$ of a particle. The x -axis thus represents the time t , $-4 \leq t \leq 7$, and the y -axis represents the velocity $v(t)$.

Let $s(t)$ be the position at time t . What is the final position $s(t = 7)$, assuming that initial position $s(-4) = 0$?

What is the total distance traveled by the particle? Recall that the total distance is given by

$$\int_{-4}^7 |v(t)| dt$$

Exercise 4 Find the maximum area of a rectangle of perimeter p .

Exercise 5 Evaluate the following integrals.

a) $\int_0^1 2x - 6x^2 \, dx$

b) $\int_0^{\frac{\pi}{3}} \sin(\omega) \, d\omega$

c) $\int_0^{2^6} \frac{\sqrt{x}}{x\sqrt[3]{x}} \, dx$

d) $\int_1^2 \left(\frac{1}{t} + 2e^t \right) \, dt$

Exercise 6 A stone is dropped from the upper observation deck (the Space Deck) of the CN Tower, 450m above the ground.

- a. Find the distance of the stone above ground level at time t .
- b. How long does it take the stone to reach the ground?
- c. With what velocity does it strike the ground?