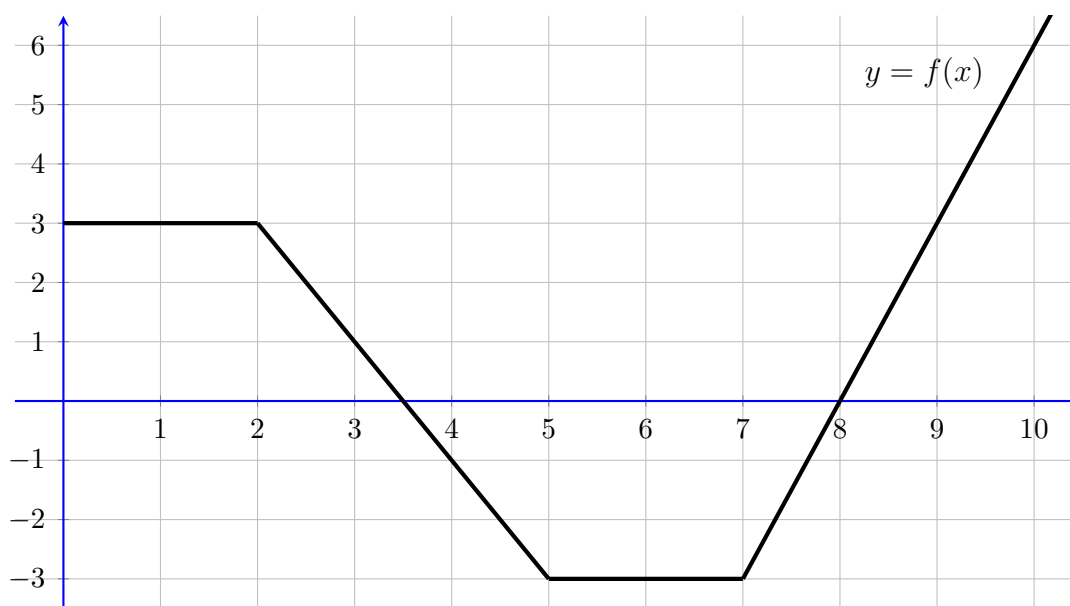


**Instructions** Each problem is worth 1 point for a total of 13 possible points. Calculators are not allowed.

## Part I

The graph of a function  $f$  is sketched below. Use this sketch for problems 1-2.



1.  $\int_0^2 f(x) dx =$

(a) -2

(b) 1

(c) 6

(d)  $\frac{13}{2}$

(e)  $\frac{17}{2}$

**Answer.** (c)

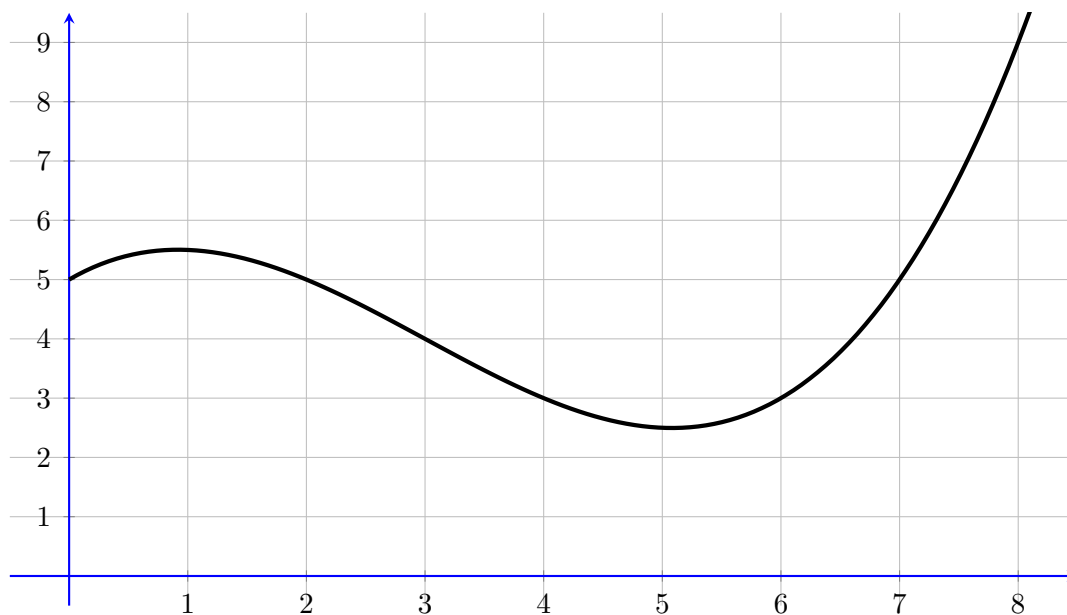
2.  $\int_0^{10} f(x) dx =$

- (a)  $-2$       (b)  $1$       (c)  $6$       (d)  $\frac{9}{2}$       (e)  $\frac{13}{2}$

**Answer.** (d)

## Part II

The graph of a function  $g$  is sketched below. Use this sketch for problems 3-4.



3. The Riemann sum for  $g(x)$  with  $0 \leq x \leq 8$  using  $n = 4$  and lefthand endpoints is

- (a) 12      (b) 16      (c) 24      (d) 32      (e) 40

**Answer.** (d)

4.  $\int_0^4 g(x) dx =$

- (a)  $\frac{41}{4}$                       (b) 12                      (c) 16                      (d)  $\frac{56}{3}$                       (e) 24

**Answer.** (d). The answer must be greater than 16 and less than 24.

### Part III

A table of values for a decreasing function  $f$  is listed below

$x$	2	4	10	14
$f(x)$	41	40	25	5

Use this table of values for problems 5-6.

5. Which is the best lower estimate for  $\int_2^{14} f(x)dx$ ?

- (a) 212                      (b) 232                      (c) 250                      (d) 348                      (e) 422

**Answer.** (c)

6. Which of the numbers below could possibly be  $\int_2^{14} f(x)dx$ ?

- (a) 212                      (b) 232                      (c) 250                      (d) 348                      (e) 422

**Answer.** (d)

### Part IV

7.  $\sum_{i=1}^7 (3i + 1) =$

- (a) 22                      (b) 69                      (c) 91                      (d) 122                      (e) 155

**Answer.** (c)

8.  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{2i}{n}\right)^2 \left(\frac{2}{n}\right) =$

- (a) 0                      (b)  $\frac{8}{3}$                       (c) 4                      (d) 8                      (e)  $\infty$

**Answer.** (b)

9.  $\int_0^1 x^2 dx =$

- (a) 3                      (b) 2                      (c) 1                      (d)  $\frac{1}{2}$                       (e)  $\frac{1}{3}$

**Answer.** (e)

10. If  $\int_2^3 f(x) dx = 8$ ,  $\int_3^5 f(x) dx = 2$ ,  $\int_2^5 g(x) dx = -3$ , then  $\int_2^5 f(x) + 2g(x) dx =$

- (a) 2                      (b) 4                      (c) 6                      (d) 7                      (e) 8

**Answer.** (b)

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

- (a) 2                      (b) 2.5                      (c)  $\sqrt{5}$                       (d) 3                      (e) 3.5

**Answer.** (b)

12.  $\int_0^3 \sqrt{9-x^2} dx$

- (a)  $\frac{4}{9}$       (b)  $\frac{9}{4}$       (c) 4      (d)  $\frac{9\pi}{4}$       (e) 9

**Answer.** (d)

**13.** Which one of the following statements is false?

- (a)  $\int_0^1 x + x^2 dx = \int_0^1 x dx + \int_0^1 x^2 dx$
- (b)  $\int_0^1 x^2 dx = \left( \int_0^1 x dx \right)^2$
- (c)  $\int_{-8}^8 7x^5 + 3x^3 + 5x^2 - 5x dx = 10 \int_0^8 x^2 dx$
- (d)  $\int_0^1 x^2 dx \leq \int_0^1 x dx$
- (e)  $\int_1^2 x dx \leq \int_1^2 x^2 dx$

**Answer.** (b)