# 6.6 / Practice workbook

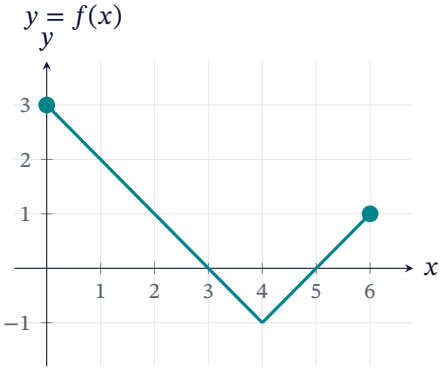
*Applying Properties of Definite Integrals*

## Practice

Problems 1–6 / Show your reasoning

1 If $\int_2^6 f(x)\,dx = 9$ and $\int_2^4 f(x)\,dx = 4$, find $\int_4^6 f(x)\,dx$ and $\int_6^4 2f(x)\,dx$.

2 The graph of $f$, made of two segments, is shown. What is $\int_6^0 f(x)\,dx$?




A. $-6$
B. $-4$
C. $4$
D. $6$

3 If $\int_1^4 f(x)\,dx = 5$, then $\int_1^4 (2f(x) + 3)\,dx =$

A. 13
B. 16
C. 19
D. 25

4 Let $f(x) = 5 - \frac{x}{2}$ for $x \leq 2$ and $f(x) = x - 1$ for $x > 2$.

**(a)** Find $\int_0^5 f(x)\,dx$.

**(b)** Find $\int_5^0 (f(x) - 2)\,dx$.

5 Suppose $\int_0^4 f(x)\,dx = 7$, $\int_2^4 f(x)\,dx = 5$, and $\int_0^4 g(x)\,dx = -3$.

**(a)** Find $\int_0^2 f(x)\,dx$.

**(b)** Find $\int_4^0 (f(x) - 3g(x))\,dx$.

**(c)** Find $k$ so that $\int_0^4 (f(x) + k)\,dx = 15$.

6 The graph of $f$ and the $x$-axis bound regions $A$, $B$, and $C$, with areas 3, 5, and 2. $A$ $(0 \le x \le 2)$ and $C$ $(5 \le x \le 7)$ are above the axis; $B$ $(2 \le x \le 5)$ is below. What is $\int_7^2 (f(x) + 1)\,dx$?

A. $-2$

B. $2$

C. $-8$

D. $8$

# 6.6 / Answer key

*Applying Properties of Definite Integrals*

**P01** $\displaystyle\int_4^6 f\,dx = \int_2^6 f\,dx - \int_2^4 f\,dx = 9 - 4 = 5$

$\displaystyle\int_6^4 2f\,dx = -2\int_4^6 f\,dx = -10$

**P02** (B) $0 \to 3:\ +\frac{1}{2}\cdot 3\cdot 3 = \frac{9}{2}, \quad 3 \to 5:\ -\frac{1}{2}\cdot 2\cdot 1 = -1, \quad 5 \to 6:\ +\frac{1}{2}$

$\displaystyle\int_0^6 f\,dx = \frac{9}{2} - 1 + \frac{1}{2} = 4 \ \to\ \int_6^0 f\,dx = -4$

Answer B.

**P03** (C) $\displaystyle\int_1^4 (2f+3)\,dx = 2\int_1^4 f\,dx + \int_1^4 3\,dx$

$= 2\cdot 5 + 3(4-1) = 19$

Answer C.

**P04** $\frac{1}{2}(5+4)\cdot 2 + \frac{1}{2}(1+4)\cdot 3 = 9 + \frac{15}{2} = \frac{33}{2}$

$-\left(\frac{33}{2} - 2\cdot 5\right) = -\frac{13}{2}$

**P05** $7 - 5 = 2$

$-(7 - 3(-3)) = -16$

$7 + 4k = 15 \ \to\ k = 2$

**P06** (A) $\displaystyle\int_2^7 f\,dx = -5 + 2 = -3, \quad \int_2^7 1\,dx = 7 - 2 = 5$

$\displaystyle\int_7^2 (f+1)\,dx = -(-3+5) = -2$

Answer A.