# 8.6 / Practice workbook

*Finding the Area Between Curves That Intersect at More Than Two Points*

## Practice

Problems 1–6 / Show your reasoning

1 Find the total area of the regions between $y = x^3$ and $y = 9x$.

2 $f$ and $g$ cross only at $x = 0$, 2, and 5; $f$ is above $g$ on $(0, 2)$ and below on $(2, 5)$. Which of the following gives the total area between the graphs of $f$ and $g$ on $[0, 5]$?

A. $\int_0^2 (f - g)\,dx + \int_2^5 (g - f)\,dx$

B. $\int_0^5 (f - g)\,dx$

C. $\left|\int_0^5 (f - g)\,dx\right|$

D. $\int_0^2 (g - f)\,dx + \int_2^5 (f - g)\,dx$

3 Find the total area of the regions between $y = x(x - 1)(x - 2)$ and the $x$-axis.

4 $f$ and $g$ cross only at $x = 3$ on $[0, 6]$. $\int_0^3 (f - g)\,dx = 5$ and $\int_3^6 (f - g)\,dx = -2$. Find $\int_0^6 (f - g)\,dx$ and the total area between $f$ and $g$ on $[0, 6]$.

## 8.6 / AP-style free response

*Problem 5* ➤ */ Show the work and the reasons a grader looks for.*

Let $f(x) = x^3 - 3x^2$ and $g(x) = x - 3$.

**(a)** Find all values of $x$ where the graphs of $f$ and $g$ cross.

**(b)** Find the total area of the regions between the graphs of $f$ and $g$.

**(c)** Find $\int_{-1}^{3} (f(x) - g(x))\,dx$. Explain why it is not the area in part (b).

6 Find the total area between $y = 2\cos x$ and $y = 1$ for $0 \leq x \leq 2\pi$.

# 8.6 / Answer key

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**1** $\frac{81}{2}$

**2** (A)

**3** $\frac{1}{2}$

**4** (a) $\int_0^6 (f-g)\,dx = 3$; (b) area 7

**5** (a) $x = -1,\ 1,\ 3$; (b) 8; (c) 0: the pieces 4 and $-4$ cancel

**6** $4\sqrt{3} + \frac{2\pi}{3}$