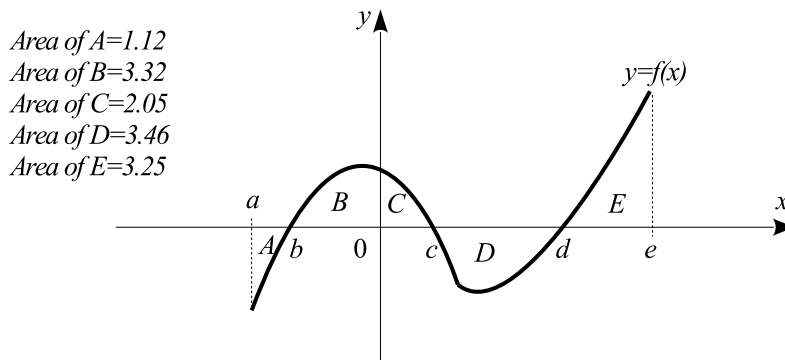


Sample problems for Test 3

1. Let $\int_1^5 f(x)dx = 2$, $\int_1^3 g(x)dx = -1$, and $\int_3^5 g(x)dx = 4$. Find $\int_5^1 (4g(x) - 3f(x))dx$.
2. Calculate $2 \int_a^c f(x) dx - \int_0^e f(x) dx$ by referring to the figure with the indicated areas.



3. Find the following indefinite integrals:

- (a) $\int \frac{1}{\sqrt{x}} e^{\sqrt{x}} dx$
- (b) $\int \frac{x^3 - 3}{x^4 - 12x + 3} dx$
- (c) $\int \frac{(\ln x)^2}{x} dx$
- (d) $\int \frac{x}{(5 - 2x^2)^5} dx$
- (e) $\int \frac{x}{\sqrt{3-x}} dx$
- (f) $\int e^{2x-1} dx$

4. The weekly marginal revenue from the sale of x pairs of tennis shoes is given by

$$R'(x) = 40 - 0.002x + \frac{200}{x+1}, \quad R(0) = 0,$$

where $R(x)$ is revenue in dollars. Find the revenue function $R(x)$. Find the revenue from the sale of 1000 pairs of shoes.

5. Use L_6 and R_6 to approximate $\int_2^5 (0.25x^2 - 4)dx$.

6. Evaluate each of the definite integrals:

(a) $\int_0^A 32(x^2 + 1)^7 x dx \quad (A > 0)$

(b) $\int_B^2 \left(5x - 4\sqrt[4]{x^3} \right) dx, \quad (0 < B < 2)$

7. Find the average value of the function $f(x) = 4x - 3x^2$ over the interval $[-2, 2]$.

8. Find the area of the region bounded by:

(a) $y = 3 - x^2, y = 2x^2 - 4x$

(b) $y = x^3, y = 4x$

(c) $y = -x^2 - 2x, y = 0, x = -2, x = 1$.

9. Find the consumers' surplus and producers' surplus at the equilibrium price level for the given price-demand and price-supply equations.

$$\begin{aligned} p &= D(x) = 70 - 0.2x \\ p &= S(x) = 13 + 0.0012x^2 \end{aligned}$$

Round all values to the nearest integer.

10. Let $f(x, y) = 2x - 3y + 14$ and $g(x, y) = \frac{10}{x^2 + 4y}$. Find $f(2, -3) - 4g(-1, 2)$.

11. Weston Publishing publishes a deluxe edition and a standard edition of its English language dictionary. Weston's management estimates that the number of deluxe editions demanded is x copies/day and the number of standard editions demanded is y copies/day when the unit prices are

$$\begin{aligned} p &= 20 - 0.005x - 0.001y \\ q &= 15 - 0.001x - 0.003y \end{aligned}$$

dollars, respectively. Find the daily total revenue function $R(x, y)$. Evaluate $R(7, 3)$.

12. Find f_x and f_y for the functions:

(a) $f(x, y) = \frac{2xy}{1 + x^2y^2}$

(b) $f(x, y) = \sqrt{2x - y^2}$

(c) $f(x, y) = xe^{x\sqrt{y}}$

13. Find $f_x, f_y, f_{xx}, f_{xy},$ and f_{yy} for the function $f(x, y) = -4x^3y^5 + 9x^6y^2$.