

HW72: Applications of the Definite Integral

1. Suppose that f and g are continuous and that

$$\int_1^2 f(x) dx = -4, \quad \int_1^5 f(x) dx = 6, \quad \int_1^5 g(x) dx = 8.$$

Find:

a) $\int_2^5 g(x) dx$

b) $\int_5^1 g(x) dx$

c) $\int_1^2 3f(x) dx$

d) $\int_2^5 f(x) dx$

e) $\int_1^5 [f(x) - g(x)] dx$

f) $\int_1^5 [4f(x) - g(x)] dx$

2. Suppose that $\int_1^2 f(x) dx = 5$. Find:

a) $\int_1^2 f(u) du$

b) $\int_1^2 \sqrt{3}f(z) dz$

c) $\int_2^1 f(t) dt$

d) $\int_1^2 [-f(x)] dx$

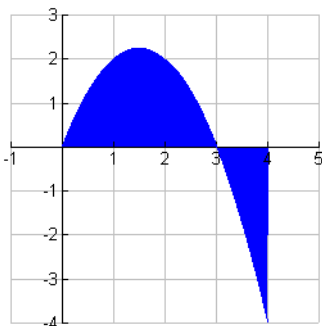
3. Suppose that f is continuous and that $\int_0^3 f(z) dz = 3$ and $\int_0^4 f(z) dz = 7$. Find:

a) $\int_3^4 f(z) dz$

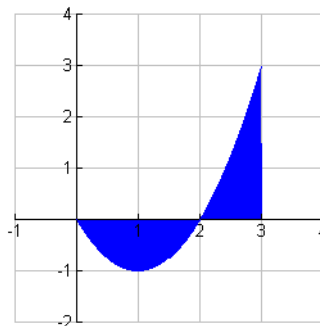
b) $\int_4^3 f(t) dt$

In Exercises 4-6 find the total shaded area.

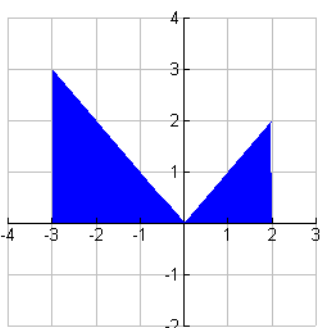
4. $y = 3x - x^2$



5. $y = x^2 - 2x$

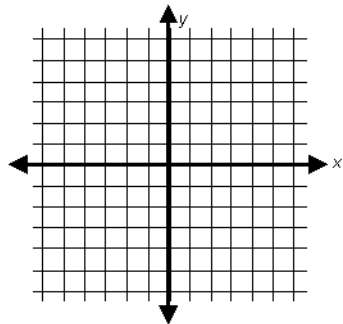


6. $y = |x|$

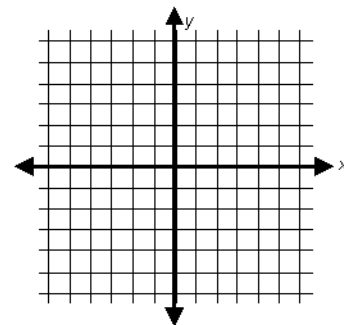


In exercises 7-10 graph the function over the given interval. Then (a) integrate the function over the interval and (b) find the area of the region between the graph and the x-axis.

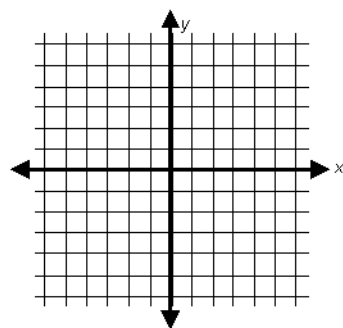
7. $y = x^2 - 6x + 8$, $[0, 3]$



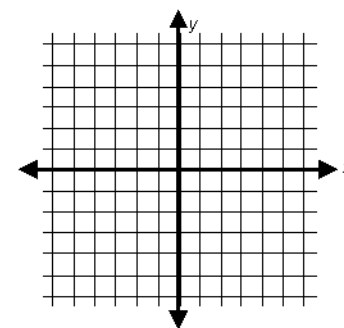
8. $y = -x^2 + 5x - 4$, $[0, 2]$



9. $y = 2x - x^2$, $[0, 3]$



10. $y = x^2 - 4x$, $[0, 5]$



Applications of the Definite Integral: KEY

1. a) 0
b) -8
c) -12
d) 10
e) -2
f) 16

2. a) 5
b) $5\sqrt{3}$
c) -5
d) -5

3. a) 4
b) -4

4. Area = $\frac{19}{3} \approx 6.3$

5. Area = $\frac{8}{3} \approx 2.6$

6. Area = $\frac{13}{2} = 6.5$

7. Area = $\frac{22}{3} \approx 7.3$

Integral = 6

Area = 3

8. Integral = $-\frac{2}{3}$

9. Area = $\frac{8}{3}$

Integral = 0

Area = 13

10. Integral = $-\frac{25}{3}$