TEST 4 PROBLEMS

1. Given the graph of $y = f(x)$ in Figure 1, where is the global maximum of $f(x)$?

(a) $x = 2$ (b) $x = -6$

(c) $x = -3$ (d) $x = 4$

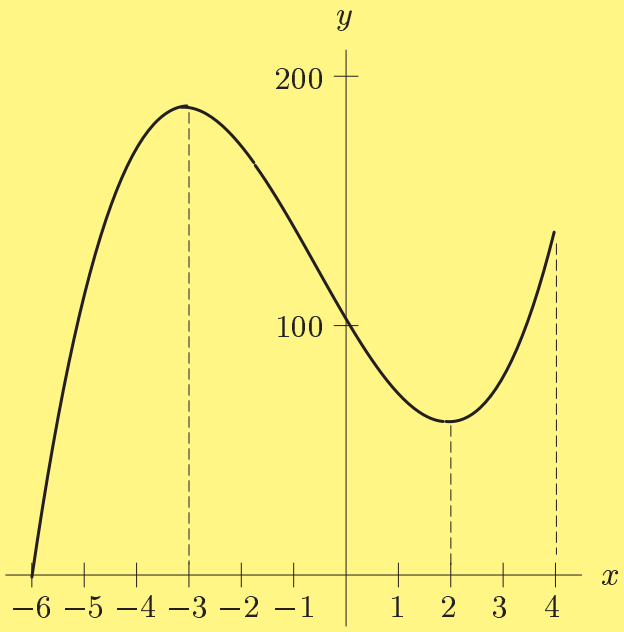
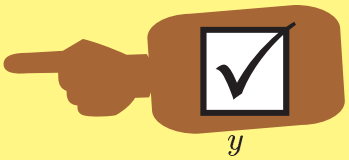


Figure 1

1. Given the graph of $y = f(x)$ in Figure 1, where is the global maximum of $f(x)$?

(a) $x = 2$ (b) $x = -6$

(c) $x = -3$  (d) $x = 4$

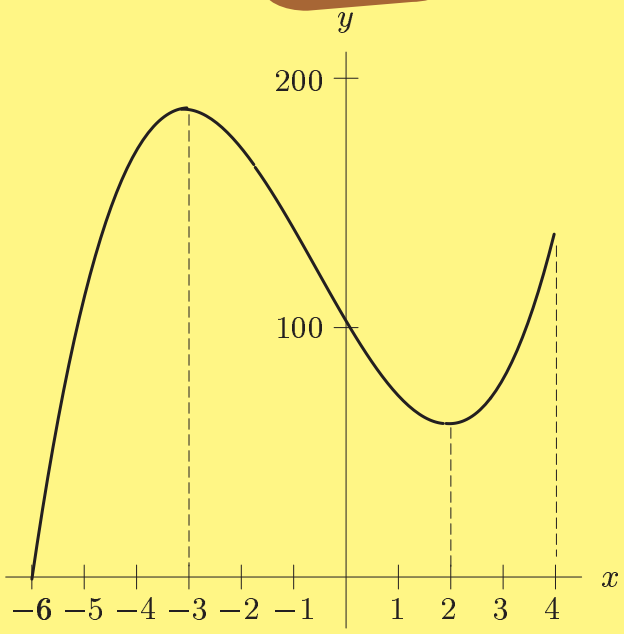


Figure 1

2. Given the graph of $y = f(x)$ in Figure 1, where is the global minimum of $f(x)$?

(a) $x = 4$ (b) $x = 2$

(c) $x = -6$ (d) $x = -3$

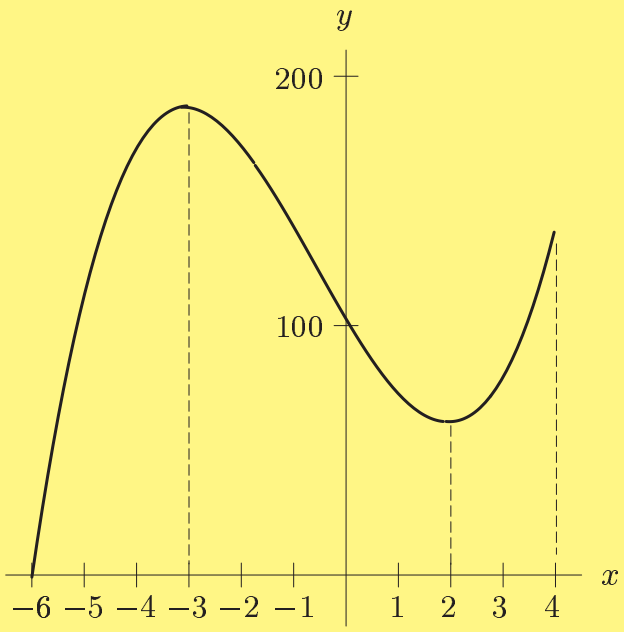


Figure 1

2. Given the graph of $y = f(x)$ in Figure 1, where is the global minimum of $f(x)$?

(a) $x = 4$ (b) $x = 2$

(c) $x = -6$ (d) $x = -3$

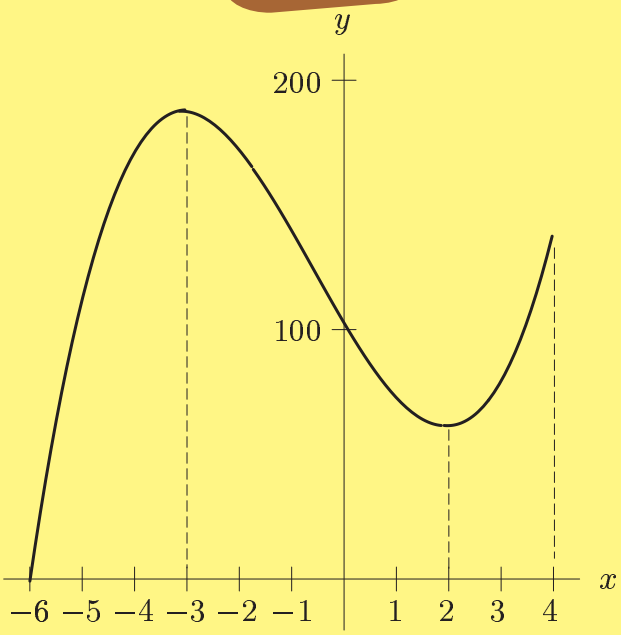


Figure 1

3. Given the graph of $y = f(x)$ in Figure 1, what is the global minimum *value* of $f(x)$?

(a) $\mathbf{70}$

(b) $\mathbf{100}$

(c) $\mathbf{-6}$

(d) $\mathbf{0}$

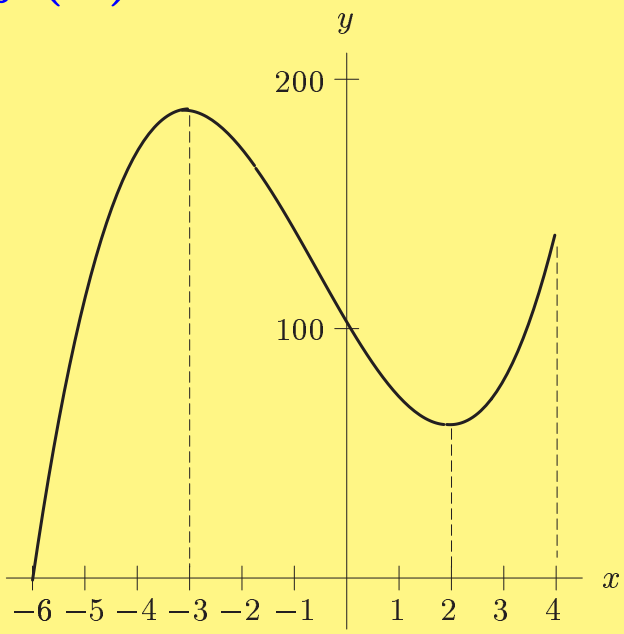


Figure 1

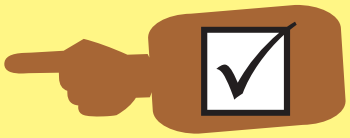
3. Given the graph of $y = f(x)$ in Figure 1, what is the global minimum *value* of $f(x)$?

(a) **70**

(b) **100**

(c) **−6**

(d) **0**



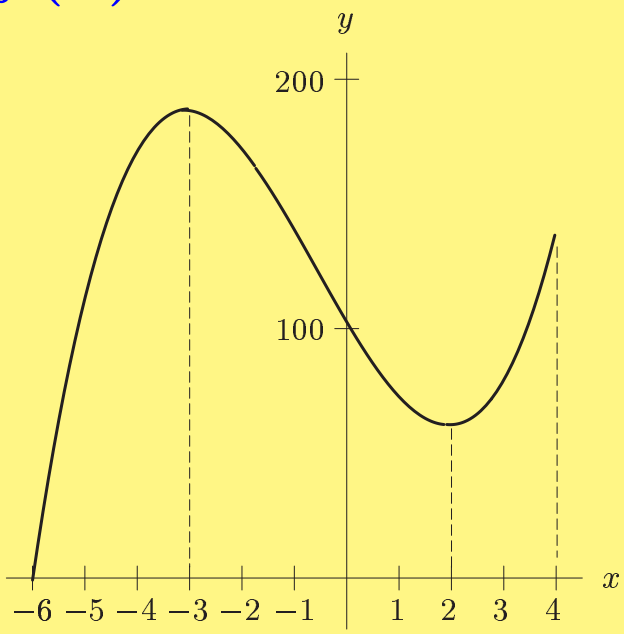


Figure 1

4. If the cost function in dollars associated with selling q items of a certain product is $C(q) = q^2 - q + 100$, then what is the average cost in dollars per item associated with selling the first 10 items of the product?

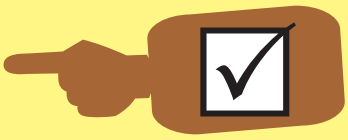
   (a) 19

   (b) 15

   (c) 22

   (d) 12

4. If the cost function in dollars associated with selling q items of a certain product is $C(q) = q^2 - q + 100$, then what is the average cost in dollars per item associated with selling the first 10 items of the product?

(a) 19 

(b) 15

(c) 22

(d) 12

5. The cost function $C(q)$ and revenue function $R(q)$ for the production of a certain item are given in Figure 2. At what production level is the profit maximized?

(a) 50

(b) 200

(c) 100

(d) 150

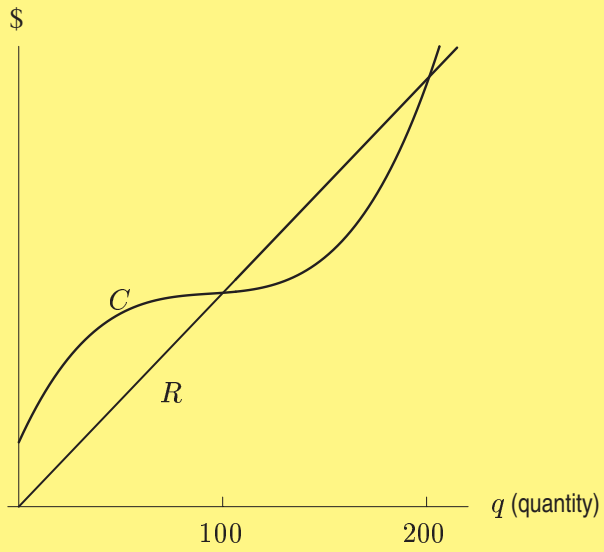


Figure 2

5. The cost function $C(q)$ and revenue function $R(q)$ for the production of a certain item are given in Figure 2. At what production level is the profit maximized?

(a) 50

(b) 200

(c) 100

(d) 150

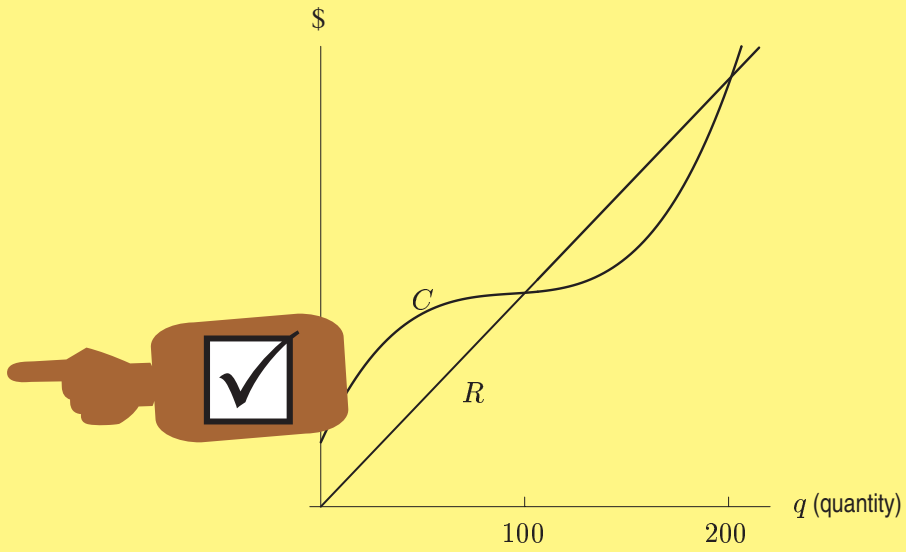


Figure 2

6. The *marginal* cost function $MC(q)$ and *marginal* revenue function $MR(q)$ for the production of a certain item are given in Figure 3. Which one of the following choices can be the approximate production level where the profit is maximized?

(a) **30**

(b) **200**

(c) **100**

(d) **150**

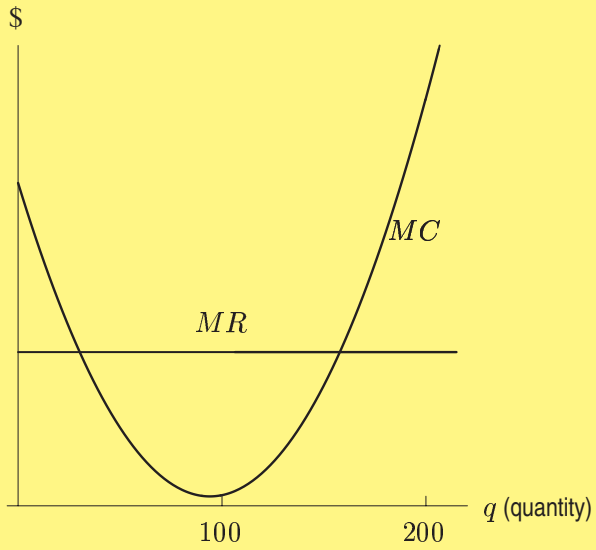


Figure 3

6. The *marginal* cost function $MC(q)$ and *marginal* revenue function $MR(q)$ for the production of a certain item are given in Figure 3. Which one of the following choices can be the approximate production level where the profit is maximized?

(a) **30**

(b) **200**

(c) **100**

(d) **150**

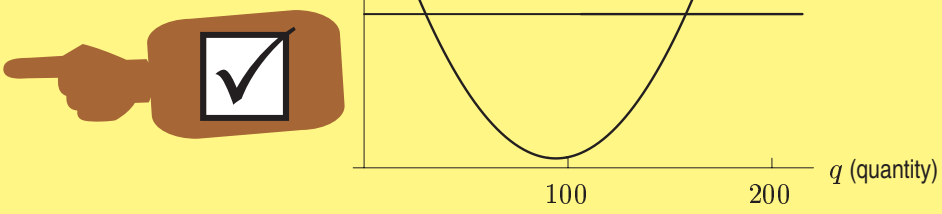


Figure 3

7. The cost function $C(q)$ associated with the production of a certain item is given in Figure 4 to the right. At approximately what production level is the *average* cost minimized?

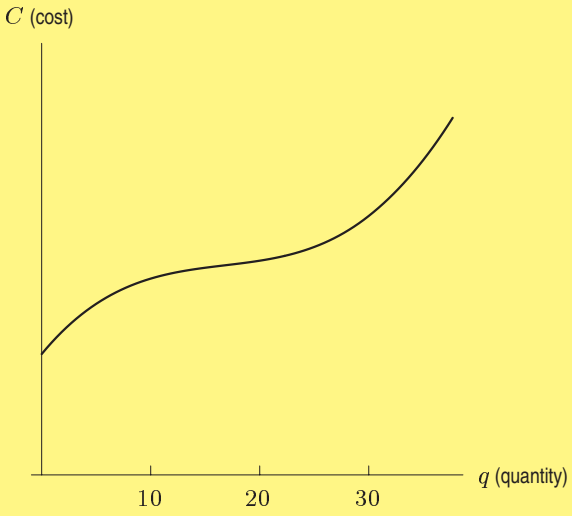


Figure 4

(a) **10** (b) **30**

(c) **20** (d) **0**

7. The cost function $C(q)$ associated with the production of a certain item is given in Figure 4 to the right. At approximately what production level is the *average* cost minimized?

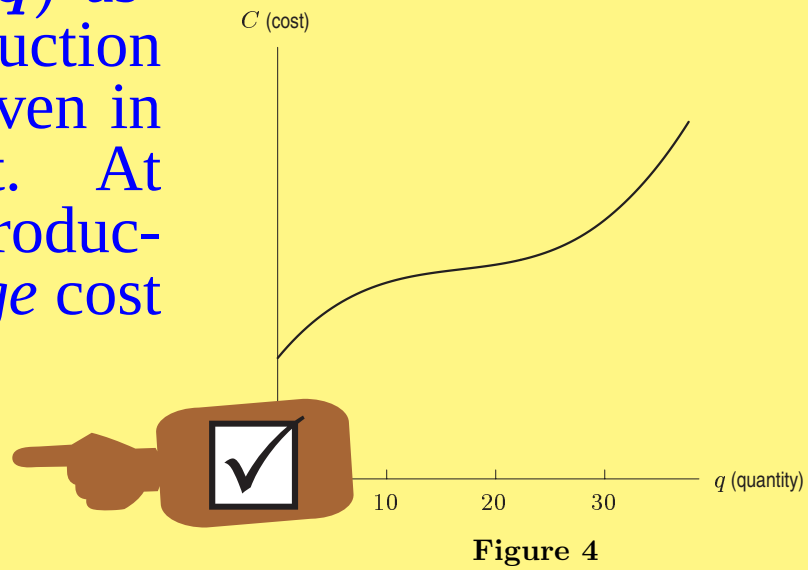


Figure 4

(a) **10**

(b) **30**

(c) **20**

(d) **0**

8. What is the value of $\int_0^2 e^x \, dx$?

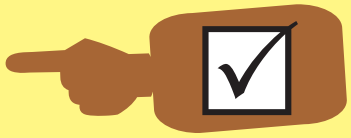
(a) $e^2 - 1$

(b) e^2

(c) e^3

(d) $\dfrac{e^3 - 1}{3}$

8. What is the value of $\int_0^2 e^x \, dx$?

(a) $e^2 - 1$ 

(b) e^2

(c) e^3

(d) $\dfrac{e^3 - 1}{3}$

9. What is the area of the region under the graph of $y = x^3$ and above the x-axis with $0 \leq x \leq 2$?

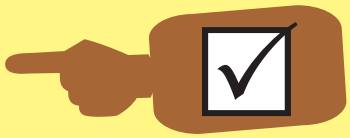
(a) 4

(b) 8

(c) $\frac{8}{3}$

(d) $\frac{16}{3}$

9. What is the area of the region under the graph of $y = x^3$ and above the x-axis with $0 \leq x \leq 2$?

(a) 4 

(b) 8

(c) $\frac{8}{3}$

(d) $\frac{16}{3}$

10. What is the value of $\int_0^3 f(x)\,dx$ for the function $f(x)$ graphed in Figure 5?

(a) $\frac{1}{2}$

(b) $\frac{3}{2}$

(c) 1

(d) 2

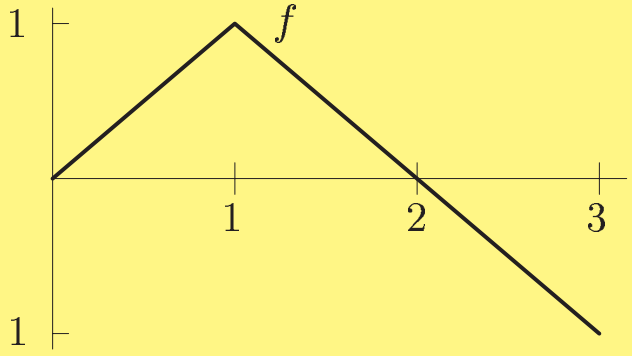
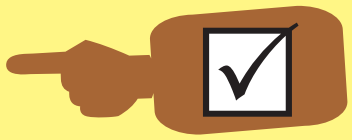


Figure 5

10. What is the value of $\int_0^3 f(x)\,dx$ for the function $f(x)$ graphed in Figure 5?

(a) $\frac{1}{2}$ 

(b) $\frac{3}{2}$

(c) 1

(d) 2

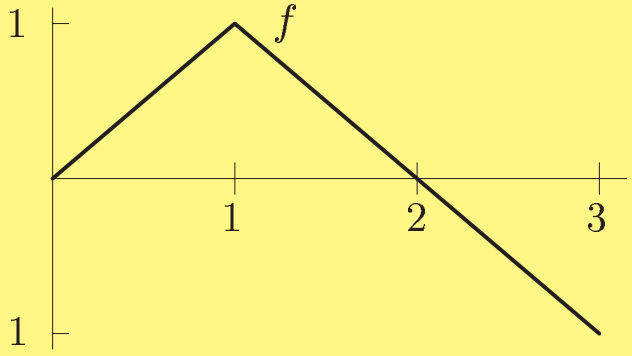


Figure 5

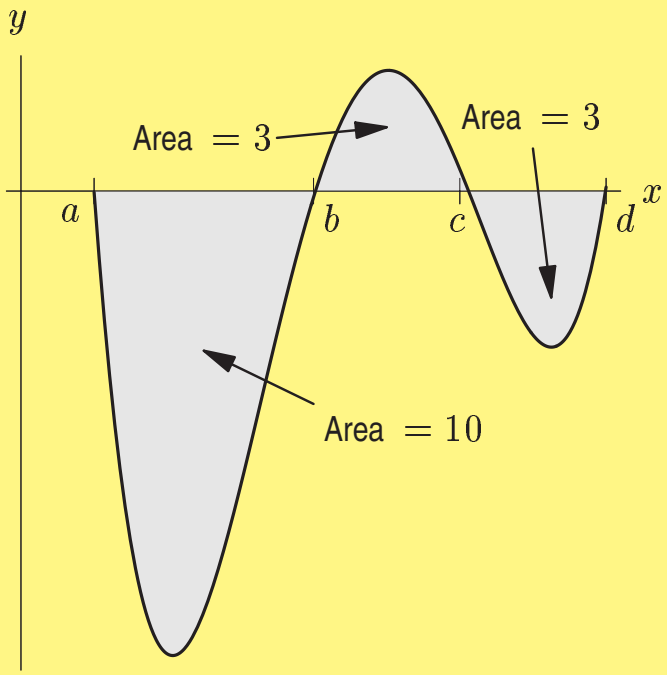


Figure 6

11. Given the function graphed in Figure 6 above, what is the value of $\int_a^d f(x)\,dx$?

(a) **16** (b) **−10** (c) **3** (d) **−13**

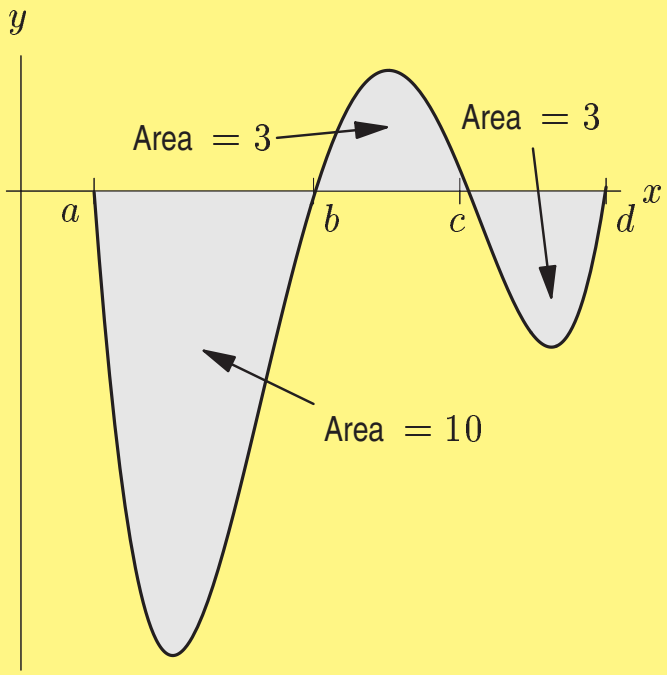


Figure 6

11. Given the function graphed in Figure 6 above, what is the value of $\int_a^d f(x)\,dx$?

(a) **16** (b) **−10** (d) **−13**

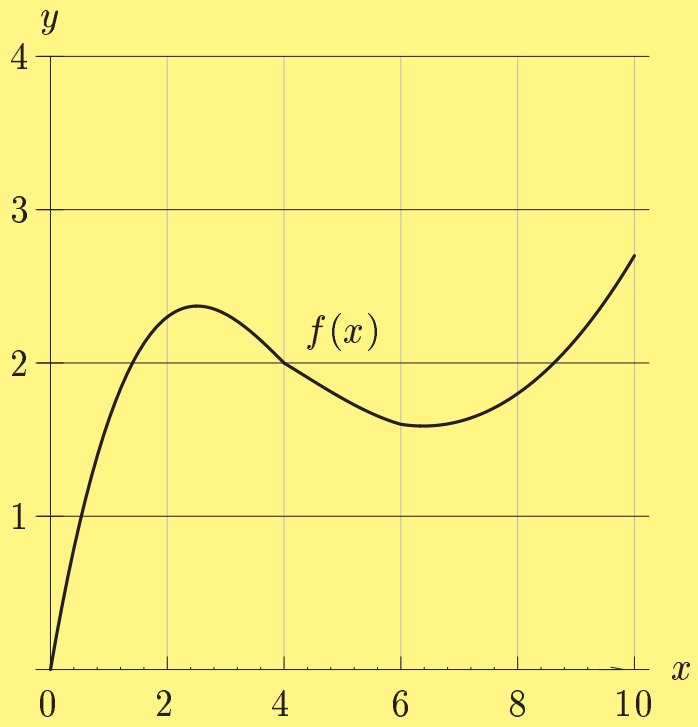


Figure 7

12. Given the function graphed in Figure 7 above, what is the approximate value of $\int_0^{10} f(x)\,dx$?

(a) **22** (b) **19** (c) **8** (d) **12**

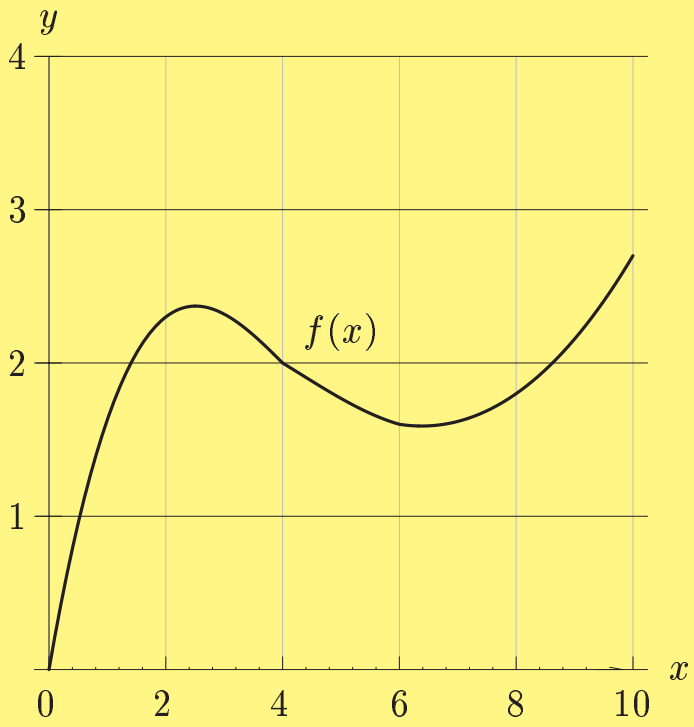


Figure 7

12. Given the function graphed in Figure 7 above, what is the approximate value of $\int_0^{10} f(x)\,dx$?

(a) **22** (b) **19** (c) **8** (d) **12**

13. If the *marginal* cost in dollars of producing a certain quantity q of an item is given by $3q^2 - 1$ and the fixed cost is $\$1000$, then what is the cost of producing the first 20 items?

    (a) $\$1199$

    (b) $\$199$

    (c) $\$6980$

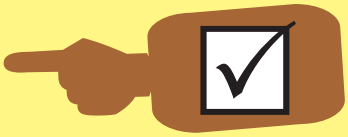
    (d) $\$8980$

13. If the *marginal* cost in dollars of producing a certain quantity q of an item is given by $3q^2 - 1$ and the fixed cost is $\$1000$, then what is the cost of producing the first 20 items?

(a) $\$1199$

(b) $\$199$

(c) $\$6980$

(d) $\$8980$ 

14. Given that

$$\int_0^1 f(x)\,dx = 2, \qquad \int_1^3 f(x)\,dx = -1,$$

$$\text{and} \quad \int_3^5 f(x)\,dx = 3,$$

what is the value of $\int_0^5 f(x)\,dx$?

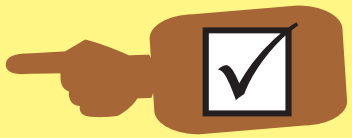
(a) 5 (b) -5 (c) 4 (d) 6

14. Given that

$$\int_0^1 f(x)\,dx = 2, \qquad \int_1^3 f(x)\,dx = -1,$$

and $$\int_3^5 f(x)\,dx = 3,$$

what is the value of $\int_0^5 f(x)\,dx$?

(a) 5 (b) -5 (c) 4  6