

**Find the integral.**

1)  $\int (3x - 5) dx$

2)  $\int \sqrt{x} + \frac{x}{x^5} dx$

3)  $\int \frac{5}{x} + 2e^x dx$

4)  $\int \frac{x^5 + 1}{x} dx$

**Solve the problem.**

5) The slope of the tangent line to a curve is given by  $f'(x) = x^2 - 5x + 11$ . If the point  $(0, 9)$  is on the curve, find an equation of the curve.

6) Find the cost function  $C(x)$  if the marginal cost  $C'(x) = \sqrt{x}$  and the fixed cost is \$22.

**Find the integral.**

7)  $\int 4(2x + 5)^3 dx$

8)  $\int \frac{dr}{\sqrt{6r - 7}}$

9)  $\int 2e^{4z} dz$

10)  $\int te^{-7t^2} dt$

11)  $\int \frac{e^x dx}{e^x + e}$

12)  $\int \frac{3}{3x + 1} dx$

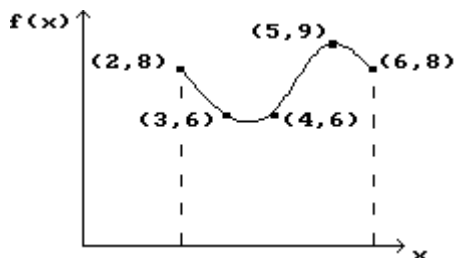
13)  $\int \frac{x}{(1 - x)^6} dx$

Calculate the left sum for the integral using the given number of rectangles.

$$14) \int_0^6 (2x^2 + x + 3) dx, n = 6$$

Estimate the area under the curve by summing the area of rectangles. Use rectangles of width 1 and let the function value at the left side of each rectangle give the height of the rectangle. Round to the nearest unit.

15)



Evaluate the integral.

$$16) \int_{-1}^1 (x^2 + 1) dx$$

$$17) \int_{-2}^{-1} 2x^{-4} dx$$

Evaluate the definite integral.

$$18) \int_0^2 (4x + 4)^4 dx$$

$$19) \int_0^1 \frac{1}{7x + 8} dx$$

$$20) \int_{-4}^4 e^{x/4} dx$$

$$21) \int_1^3 \frac{4x + 7}{x} dx$$

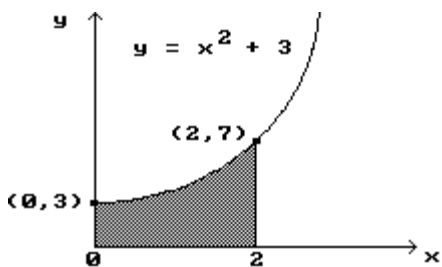
Use the definite integral to find the area between the  $x$ -axis and the graph of  $f(x)$  over the indicated interval.

$$22) f(x) = x^2 - 6x + 9; [2, 4]$$

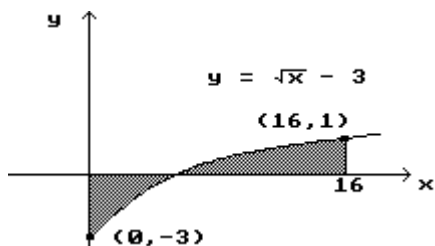
$$23) f(x) = 2x + 7; [-6, -4]$$

Find the area of the shaded region.

24)



25)



Find the area between the graphs of the given functions.

26)  $f(x) = x^2 - 1$  and  $g(x) = 2x + 2$

Solve the problem.

27) A certain company has found that its expenditure rate per day (in hundreds of dollars) on a certain type of job is given by  $E'(x) = 8x + 3$ , where  $x$  is the number of days since the start of the job. Find the expenditure if the job takes 3 days.

28) A certain object moves in such a way that its velocity (in m/s) after time  $t$  (in s) is given by  $v = t^2 + 5t + 9$ . Find the distance traveled during the first four seconds.

Find the general solution of the differential equation.

29)  $\frac{dy}{dx} + 18x = 6x^2$

30)  $\frac{dy}{dx} = 4e^{3x}$

Find the particular solution of the differential equation.

31)  $\frac{dy}{dx} = 4x + 9$ ;  $y = -13$  when  $x = 0$

32)  $\frac{dy}{dx} + 2x = 3x^2$ ;  $y = 17$  when  $x = 0$

**Solve the problem.**

- 33) The rate of expenditure of a particular machine is given by  $M'(x) = 15x\sqrt{x^2 + 5}$ , where  $x$  is time measured in years. Maintenance costs through the second year are \$128. Find the total maintenance function and maintenance costs through the tenth year.
- 34) The rate of change in the number of bacteria (in thousands) in a culture after the introduction of a bactericide is  $dy/dt = 100 - y$ , where  $y$  is the number of bacteria (in thousands) at time  $t$ . How many bacteria are present at  $t = 13$  if the initial population was 1,000,000 thousand? (Round results to the nearest thousand bacteria.)

**Provide an appropriate response.**

- 35) Suppose we wish to use a substitution to find  $\int (x^2 + 2) dx$ , and we let  $u = x^2 + 2$ . Which of the following would be the correct results?  
i)  $\int u du$       ii)  $\int \left(\frac{u}{2}\right) du$       iii)  $\int (u - 2) du$
- 36) If we use  $u = x^2$  as a substitution to find  $\int x e^{x^2} dx$ , then which of the following would be the correct results?  
i)  $\int \left(\frac{e^u}{2}\right) du$       ii)  $\int (2e^u) du$       iii)  $\int (ue^u) du$
- 37) If  $f(x) \geq 0$  on the interval  $[a, b]$ , then  $\int_a^b f(x) dx$  represents  
i) to the right of the  $y$ -axis between  $y = a$  and  $y = b$ .  
ii) the area above the  $x$ -axis between  $x = a$  and  $x = b$ .  
iii) the area below the  $x$ -axis between  $x = a$  and  $x = b$ .

# Answer Key

Testname: TEST4RVW041

1)  $\frac{3}{2}x^2 - 5x + k$

2)  $\frac{2}{3}x^{3/2} - \frac{1}{3x^3} + k$

3)  $5 \ln|x| + 2e^x + k$

4)  $\frac{1}{5}x^5 + \ln|x| + k$

5)  $f(x) = \frac{1}{3}x^3 - \frac{5}{2}x^2 + 11x + 9$

6)  $C(x) = \frac{2}{3}x^{3/2} + 22$

7)  $\frac{1}{2}(2x + 5)^4 + C$

8)  $\frac{1}{3}\sqrt{6r - 7} + C$

9)  $\frac{1}{2}e^{4z} + C$

10)  $-\frac{1}{14}e^{(-7t^2)} + C$

11)  $\ln|e^x + e| + C$

12)  $\ln|3x + 1| + C$

13)  $-\frac{1}{4}\left(\frac{1}{(1-x)^4}\right) + \frac{1}{5}\left(\frac{1}{(1-x)^5}\right) + C$

14) 143

15) 29

16)  $2\frac{2}{3}$

17)  $\frac{7}{12}$

18) 12,390.4

19)  $\frac{1}{7} \ln \frac{15}{8}$

20)  $4(e - e^{-1})$

21)  $8 + 7 \ln 3$

22)  $\frac{2}{3}$

23) 6

24)  $\frac{26}{3}$

25)  $\frac{38}{3}$

26)  $10\frac{2}{3}$  sq. units

27) \$4500

28) 97.3 m

## Answer Key

Testname: TEST4RVW041

29)  $2x^3 - 9x^2 + C$

30)  $\frac{4}{3} e^{3x} + C$

31)  $y = 2x^2 + 9x - 13$

32)  $y = x^3 - x^2 + 17$

33)  $M(x) = 5(x^2 + 5)^{3/2} - 7$  ; \$5,372.65

34) 102 thousand bacteria

35) None of these is correct.

36) i is correct.

37) Only ii is correct.