

1. $\int \frac{\sin x dx}{\sqrt{1-\cos x}}$

2. $\int x^2 \sqrt{x+3} dx$

3. $\int \cos^3 x dx$

4. $\int_e^{e^2} \frac{\ln x}{2x} dx$

5. $\int_0^{\frac{\pi}{4}} \sec^2 x e^{\tan x} dx$

6. $\int_1^2 (x^2+1)^2 dx$

7. If $\int_0^5 f(x) dx = 4$ and $\int_3^6 f(x) dx = -1$, find

a) $\int_0^6 f(x) dx$

b) $\int_3^5 f(x) dx$

c) $\int_1^4 f(x) dx$

d) $\int_3^6 -5f(x) dx$

8. Find the average value of the function $f(x) = x^{\frac{2}{3}}$ on the interval $[1, 8]$.

9. Find $G'(x)$ and $G''(x)$ for each function G .

a) $G(x) = \int_1^x \sin^2 t dt$

b) $G(x) = \int_x^3 (t^2 - 4t) dt$

c) $G(x) = \int_3^{x^3} \ln t dt$

d) $G(x) = \int_0^{5x} f(t) dt$

10. Evaluate each of the following limits by recognizing it as a definite integral.

a) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \sqrt{\frac{4k}{n}} \left(\frac{4}{n} \right)$

b) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \left(1 + \frac{2k}{n} \right)^2 \left(\frac{2}{n} \right)$

c) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \left(3 \left(\frac{3k}{n} \right)^2 + 1 \right) \left(\frac{3}{n} \right)$

11. Evaluate: $\int_1^3 (x^2+1) dx$ by using the

- a) Riemann sum limit process using a right endpoint . b) Left endpoint approximation with
- $n = 4$
- rectangles.

12. Evaluate a) $\int_{-2}^4 |x-2| dx$ geometrically b) using the Fundamental Theorem of Calculus.

13. Given $F(x) = \int_0^x f(t) dt$ with $y = f(t)$ over the interval $[0, 10]$ shown in the accompanying figure, answer the following.

a) $F(0) =$

h) Find the relative maximums of F

b) $F(2) =$

i) Find the relative minimums of F

c) $F(4) =$

j) Where is F increasing?

d) $F(6) =$

k) Where is F concave up?

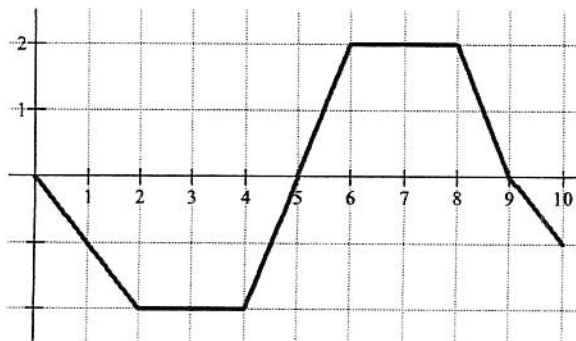
e) $F(8) =$

l) Equation of tangent line to F at $x = 6$

f) $F(9) =$

m) Absolute maximum of F

g) $F(10) =$

n) Equation of tangent line to $F(x)$ at $x = 1$ Graph of f

14. If $\int_1^5 k(2x+1) dx = 12$ find k .

Answers

1. $2\sqrt{1-\cos x} + c$ 2. $\frac{2}{7}(x+3)^{\frac{7}{2}} - \frac{12}{5}(x+3)^{\frac{5}{2}} + 6(x+3)^{\frac{3}{2}} + c$ 3. $\sin x - \frac{\sin^3 x}{3} + c$

4. $\frac{3}{4}$

5. e^{-1}

6. $178/15$

7. a) 3

b) 1

c) 0

d) 5

8. $93/35$

9. a) $\sin^2 x, \sin 2x$

b) $-x^2 + 4x, -2x + 4$

c) $9x^2 \ln x, 9x + 18x \ln x$

d) $5F(5x), 25F'(5x)$

10. a) $16/3$

b) $26/3$

c) 30

11. a) $32/3$

b) $35/4$

12. 10

13.

a) 0

b) -2

c) -6

d) -6

e) -2

f) -1

g) $-3/2$

h) R. max of -1 at $x=9$

i) R. min of -5 at $x=5$

j) $5 < x < 9$

k) $4 < x < 6$

l) $2(x-6) = y+6$

m) absol. max of 0 at $x=0$.

n) $1(x-1) = y + 1/2$

14. $k = 6/5$