

EXERCISES 5.1

In Problems 1–10, evaluate the definite integral. If necessary, review the techniques of integration in your calculus text.

1. $\int_{-1}^3 x(x-1)(x+2) dx$
2. $\int_{-1}^0 t^2 dt + \int_0^2 x^2 dx + \int_2^3 u^2 du$
3. $\int_{1/2}^1 \sin 2\pi x dx$
4. $\int_0^{\pi/8} \sec^2 2x dx$
5. $\int_0^4 \frac{dx}{2x+1}$
6. $\int_{\ln 2}^{\ln 3} e^{-x} dx$
7. $\int_2^4 xe^{-x/2} dx$
8. $\int_1^e \ln x dx$
9. $\int_2^4 \frac{dx}{x^2 - 6x + 5}$
10. $\int_2^4 \frac{2x-1}{(x+3)^2} dx$

In Problems 11–14, evaluate the line integrals $\int_C G(x, y) dx$, $\int_C G(x, y) dy$, and $\int_C G(x, y) ds$ on the indicated curve C .

11. $G(x, y) = 2xy$; $x = 5 \cos t$, $y = 5 \sin t$, $0 \leq t \leq \pi/4$
12. $G(x, y) = x^3 + 2xy^2 + 2x$; $x = 2t$, $y = t^2$, $0 \leq t \leq 1$
13. $G(x, y) = 3x^2 + 6y^2$; $y = 2x + 1$, $-1 \leq x \leq 0$
14. $G(x, y) = x^2/y^3$; $2y = 3x^{3/2}$, $1 \leq t \leq 8$

In Problems 15–18, evaluate $\int_C (2x + y) dx + xy dy$ on the given curve from $(-1, 2)$ to $(2, 5)$.

15. $y = x + 3$

16. $y = x^2 + 1$

17.

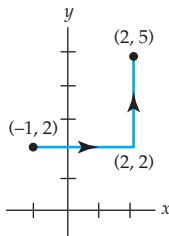


Figure for Problem 17

18.

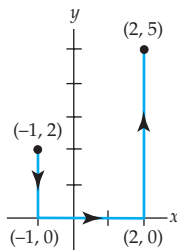


Figure for Problem 18

In Problems 19–22, evaluate $\int_C y dx + x dy$ on the given curve from $(0, 0)$ to $(1, 1)$.

19. $y = x^2$

20. $y = x$

21. C consists of the line segments from $(0, 0)$ to $(0, 1)$ and from $(0, 1)$ to $(1, 1)$.
22. C consists of the line segments from $(0, 0)$ to $(1, 0)$ and from $(1, 0)$ to $(1, 1)$.
23. Evaluate $\int_C (6x^2 + 2y^2) dx + 4xy dy$, where C is given by $x = \sqrt{t}$, $y = t$, $4 \leq t \leq 9$.
24. Evaluate $\int_C -y^2 dx + xy dy$, where C is given by $x = 2t$, $y = t^3$, $0 \leq t \leq 2$.
25. Evaluate $\int_C 2x^3 y dx + (3x + y) dy$, where C is given by $x = y^2$ from $(1, -1)$ to $(1, 1)$.
26. Evaluate $\int_C 4x dx + 2y dy$, where C is given by $x = y^3 + 1$ from $(0, -1)$ to $(9, 2)$.

In Problems 27 and 28, evaluate $\oint_C (x^2 + y^2) dx - 2xy dy$ on the given closed curve.

27.

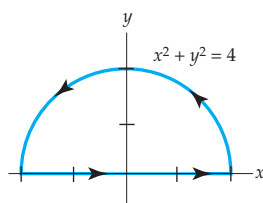


Figure for Problem 27

28.

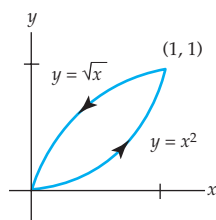


Figure for Problem 28

In Problems 29 and 30, evaluate $\oint_C x^2 y^3 dx - xy^2 dy$ on the given closed curve.

29.

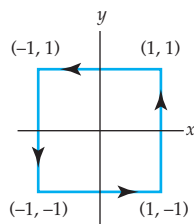


Figure for Problem 29

30.

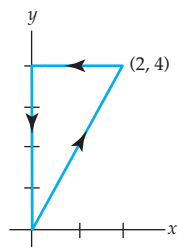


Figure for Problem 30