6.1 Exercises

In Exercises 1–4, verify directly that F is an antiderivative of f.

1. $F(x) = \dfrac{1}{3}x^3 + 2x^2 - x + 2; f(x) = x^2 + 4x - 1$

2. $F(x) = xe^x + \pi; f(x) = e^x(1 + x)$

3. $F(x) = \sqrt{2x^2 - 1}; f(x) = \dfrac{2x}{\sqrt{2x^2 - 1}}$

4. $F(x) = x \ln x - x; f(x) = \ln x$

In Exercises 5–8, (a) verify that G is an antiderivative of f, (b) find all antiderivatives of f, and (c) sketch the graphs of a few members of the family of antiderivatives found in part (b).

5. $G(x) = 2x; f(x) = 2$ **6.** $G(x) = 2x^2; f(x) = 4x$

7. $G(x) = \dfrac{1}{3}x^3; f(x) = x^2$ **8.** $G(x) = e^x; f(x) = e^x$

In Exercises 9–50, find the indefinite integral.

9. $\displaystyle\int 6\,dx$

10. $\displaystyle\int \sqrt{2}\,dx$

11. $\displaystyle\int x^3\,dx$

12. $\displaystyle\int 2x^5\,dx$

13. $\displaystyle\int x^{-4}\,dx$

14. $\displaystyle\int 3t^{-7}\,dt$

15. $\displaystyle\int x^{2/3}\,dx$

16. $\displaystyle\int 2u^{3/4}\,du$

17. $\displaystyle\int x^{-5/4}\,dx$

18. $\displaystyle\int 3x^{-2/3}\,dx$

19. $\displaystyle\int \dfrac{2}{x^3}\,dx$

20. $\displaystyle\int \dfrac{1}{3x^5}\,dx$

21. $\displaystyle\int \pi\sqrt{t}\,dt$

22. $\displaystyle\int \dfrac{3}{\sqrt{t}}\,dt$

23. $\displaystyle\int (3 - 4x)\,dx$

24. $\displaystyle\int (1 + u + u^2)\,du$

25. $\displaystyle\int (x^2 + x + x^{-3})\,dx$

26. $\displaystyle\int (0.3t^2 + 0.02t + 2)\,dt$

27. $\displaystyle\int 5e^x\,dx$

28. $\displaystyle\int (1 + e^x)\,dx$

29. $\displaystyle\int (1 + x + e^x)\,dx$

30. $\displaystyle\int (2 + x + 2x^2 + e^x)\,dx$

31. $\displaystyle\int \left(4x^3 - \dfrac{2}{x^2} - 1\right)dx$ **32.** $\displaystyle\int \left(6x^3 + \dfrac{3}{x^2} - x\right)dx$