

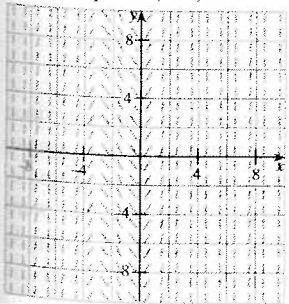
5.1 PROBLEM SET

A Find the indefinite integral in Problems 1–30.

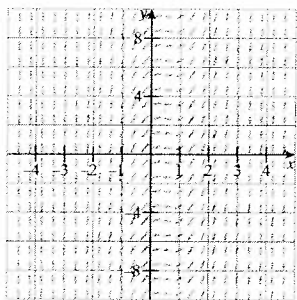
- | | |
|--|---|
| 1. $\int 2 dx$ | 2. $\int -4 dx$ |
| 3. $\int (2x + 3) dx$ | 4. $\int (4 - 5x) dx$ |
| 5. $\int (4t^3 + 3t^2) dt$ | 6. $\int (-8t^3 + 15t^5) dt$ |
| 7. $\int \frac{dx}{2x}$ | 8. $\int 14e^x dx$ |
| 9. $\int (6u^2 - 3 \cos u) du$ | 10. $\int (5t^3 - \sqrt{t}) dt$ |
| 11. $\int \sec^2 \theta d\theta$ | 12. $\int \sec \theta \tan \theta d\theta$ |
| 13. $\int 2 \sin \theta d\theta$ | 14. $\int \frac{\cos \theta}{3} d\theta$ |
| 15. $\int \frac{5}{\sqrt{1-y^2}} dy$ | 16. $\int \frac{dx}{10(1+x^2)}$ |
| 17. $\int (u^{3/2} - u^{1/2} + u^{-10}) du$ | |
| 18. $\int (x^3 - 3x + \sqrt[3]{x} - 5) dx$ | |
| 19. $\int x(x + \sqrt{x}) dx$ | 20. $\int y(y^2 - 3y) dy$ |
| 21. $\int \left(\frac{1}{t^2} - \frac{1}{t^3} + \frac{1}{t^4} \right) dt$ | 22. $\int \frac{1}{t} \left(\frac{2}{t^2} - \frac{3}{t^3} \right) dt$ |
| 23. $\int (2x^2 + 5)^2 dx$ | 24. $\int (3 - 4x^3)^2 dx$ |
| 25. $\int \left(\frac{x^2 + 3x - 1}{x^4} \right) dx$ | 26. $\int \frac{x^2 + \sqrt{x} + 1}{x^2} dx$ |
| 27. $\int \frac{x^2 + x - 2}{x^2} dx$ | 28. $\int \left(1 + \frac{1}{x} \right) \left(1 - \frac{4}{x^2} \right) dx$ |
| 29. $\int \frac{\sqrt{1-x^2} - 1}{\sqrt{1-x^2}} dx$ | 30. $\int \frac{x^2}{x^2 + 1} dx$ |

The slope $F'(x)$ at each point on a graph is given in Problems 31–38 along with one point (x_0, y_0) on the graph. Use this information to find F both graphically and analytically.

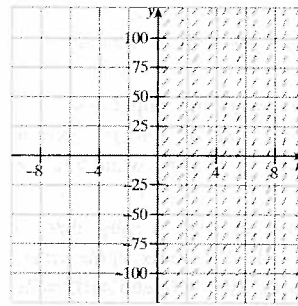
31. $F'(x) = x^2 + 3x$
with point $(0, 0)$



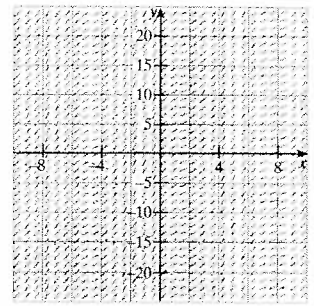
32. $F'(x) = (2x - 1)^2$
with point $(1, 3)$



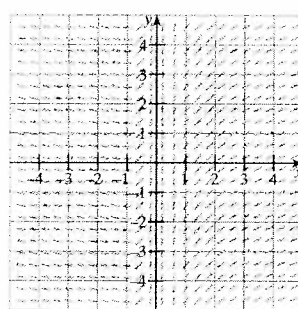
33. $F'(x) = (\sqrt{x} + 3)^2$
with point $(4, 36)$



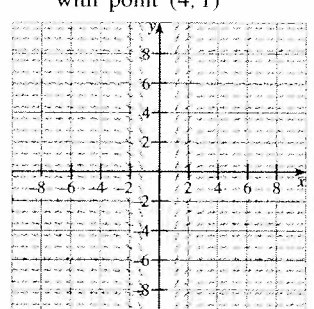
34. $F'(x) = 3 - 2 \sin x$
with point $(0, 0)$



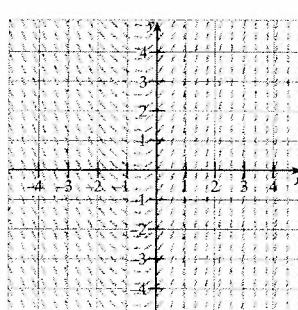
35. slope $\frac{x+1}{x^2}$
with point $(1, -2)$



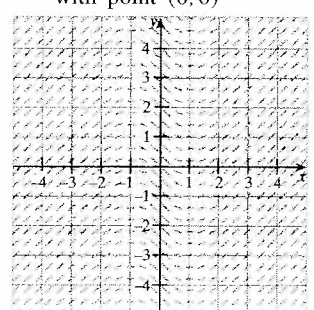
36. slope $\frac{2}{x\sqrt{x^2-1}}$
with point $(4, 1)$



37. slope $x + e^x$
with point $(0, 2)$



38. slope $\frac{x^2-1}{x^2+1}$
with point $(0, 0)$



B 39. a. If $F(x) = \int \left(\frac{1}{\sqrt{x}} - 4 \right) dx$, find F so that $F(1) = 0$.

b. Sketch the graphs of $y = F(x)$, $y = F(x) + 3$, and $y = F(x) - 1$.

c. Find a constant C_0 so that the largest value of $G(x) = F(x) + C_0$ is 0.

40. A ball is thrown directly upward from ground level with an initial velocity of 96 ft/s. Assuming that the ball's only acceleration is that due to gravity (that is, $a(t) = -32$ ft/s²), determine the maximum height reached by the ball and the time it takes to return to ground level.

41. The marginal cost of a certain commodity is $C'(x) = 6x^2 - 2x + 5$, where x is the level of production. If it costs \$5 to produce 1 unit, what is the total cost of producing 5 units?