1. $\displaystyle\int \frac{x^2 + 4x - 1}{x^2}\, dx$

2. $\displaystyle\int \frac{y^3 - 1}{\sqrt[3]{y}}\, dy$

3. $\displaystyle\int \frac{\sin x}{\cos^2 x}\, dx$

4. $\displaystyle\int \frac{\ln x}{x}\, dx$

5. $\displaystyle\int (1 - \sin x)(\cos x)\, dx$

6. $\displaystyle\int e^{5x-3}\, dx$

7. $\displaystyle\int x e^{x^2 - 1}\, dx$

8. $\displaystyle\int e^{\ln(\sin x)}\, dx$

9. $\displaystyle\int \ln e^{x^3}\, dx$

10. $\displaystyle\int e^{\sin x} \cos x\, dx$

11. Given $\dfrac{dy}{dx} = \dfrac{y+1}{x^3}$ and $y = 0$
    when $x = 1$, find $y = f(x)$.

12. $\displaystyle\int 8^{9x+2}\, dx$

13. $\displaystyle\int 3x^2 7^{2x^3 + 4}\, dx$

14. An object is thrown vertically downward at 32 feet per second from a cliff 128 feet high. How fast is the object going when it hits the ground?

15. An ball is thrown vertically upward from the roof of a 96 foot building at 16 feet per second. How high does the ball go? With what velocity does it hit the ground?

16. Given $\dfrac{dy}{dx} = \dfrac{-4x + 2}{y}$ and $y = -4$ when $x = 2$, find $y = f(x)$.

17. Given $\dfrac{dy}{dx} = 3x^2 y$ and $y = 5$ when $x = 0$, find $y = f(x)$.

18. $\displaystyle\int \frac{\csc \sqrt{x}}{\sqrt{x}}\, dx$

19. $\displaystyle\int \frac{\sin \sqrt{x}}{\sqrt{x}}\, dx$

20. Given $\dfrac{dy}{dx} = x^2 + 3x + 7$ and $y = 5$ when $x = 0$, find $y = f(x)$.

21. $\displaystyle\int \frac{2x + 1}{\sqrt{x + 3}}\, dx$

22. $\displaystyle\int \frac{x + 2}{\sqrt[3]{x + 5}}\, dx$

23. At any point (x, y) on a curve, the slope of a tangent is given by $4x - 1$. If the curve contains the point $(1, 5)$, find the equation of the curve.

24. At any point (x, y) on a curve, the slope of a tangent is given by $3x^2 - 2$. If the curve contains the point $(2, 1)$, find the equation of the curve.

25. Given $\dfrac{dy}{dx} = \dfrac{4 \sin 2x}{y}$ and $y(0) = 1$, find $y = f(x)$.

26. Find the general solution of $\dfrac{dy}{dx} = \dfrac{\ln x}{xy + xy^2}$.

27. Given $\dfrac{dy}{dx} = \dfrac{1 + x}{xy}$ and $y(1) = -4$, find $y = f(x)$.