

$$\begin{aligned}
 \text{(xiv)} \quad \frac{1}{2} \log_e x + 1 &= \frac{3}{2} \log_e 3 \\
 &\Rightarrow \log_e x + 2 = 3 \log_e 3 \\
 &\Rightarrow \log_e x - 3 \log_e 3 = -2 \\
 &\Rightarrow \log_e \left(\frac{x}{27} \right) = -2 \\
 &\Rightarrow \frac{x}{27} = e^{-2} \\
 &\Rightarrow x = 27e^{-2}
 \end{aligned}$$

Exercise 12B

- Q. 1.** (i) $\int x^4 dx = \frac{x^5}{5} + c$
 (ii) $\int 3x^4 dx = \frac{3x^5}{5} + c$
- Q. 2.** (i) $\int \cos x dx = \sin x + c$
 (ii) $\int \cos 3x dx = \frac{\sin 3x}{3} + c$
- Q. 3.** (i) $\int \sin x dx = -\cos x + c$
 (ii) $\int \sin 4x dx = -\frac{\cos 4x}{4} + c$
- Q. 4.** (i) $\int \frac{1}{x} dx = \ln x + c$
 (ii) $\int \frac{1}{2x+3} dx = \frac{\ln(2x+3)}{2} + c$
- Q. 5.** (i) $\int e^x dx = e^x + c$
 (ii) $\int e^{8x} dx = \frac{e^{8x}}{8} + c$
- Q. 6.** (i) $\int \frac{1}{\sqrt{49-x^2}} dx = \sin^{-1} \frac{x}{7} + c$
 (ii) $\int \frac{dx}{\sqrt{100-x^2}} = \sin^{-1} \frac{x}{10} + c$
- Q. 7.** (i) $\int \frac{1}{x^2+25} dx = \frac{1}{5} \tan^{-1} \frac{x}{5} + c$
 (ii) $\int \frac{dx}{x^2+625} = \int \frac{dx}{x^2+(25)^2}$
 $= \frac{1}{25} \tan^{-1} \frac{x}{25} + c$
- Q. 8.** (i) $\int \frac{x+1}{x} dx = \int \left(1 + \frac{1}{x} \right) dx$
 $= x + \ln x + c$
 (ii) $\int \frac{1}{x+1} dx = \ln(x+1) + c$

Q. 9. (i) $\int (2x+1) dx = x^2 + x + c$
 (ii) $\int (2x+1)^2 dx = \int (4x^2 + 4x + 1) dx$
 $= \frac{4x^3}{3} + 2x^2 + x + c$

Q. 10. (i) $\int \frac{1}{5x+1} dx = \frac{\ln(5x+1)}{5} + c$
 (ii) $\int \frac{1}{\sqrt{x}} dx = \int \frac{1}{x^{\frac{1}{2}}} dx$
 $= \int x^{-\frac{1}{2}} dx$
 $= 2x^{\frac{1}{2}} + c$
 $= 2\sqrt{x} + c$

Exercise 12C

- Q. 1.** (i) $\int_1^3 4x dx = 2[x^2]_1^3 = 2[9-1] = 16$
 (ii) $\int_0^1 x^2 dx = \frac{1}{3}[x^3]_0^1 = \frac{1}{3}$
 (iii) $\int_1^2 (2x+1) dx = [x^2+x]_1^2$
 $= (4+2) - (1+1) = 4$
 (iv) $\int_1^4 (2-x^2) dx = \left[2x - \frac{2x^3}{3} \right]_1^4$
 $= 2 \left[x - \frac{x\sqrt{x}}{3} \right]_1^4$
 $= 2 \left[\left(4 - \frac{4\sqrt{4}}{3} \right) - \left(1 - \frac{1\sqrt{1}}{3} \right) \right]$
 $= \frac{4}{3}$
 (v) $\int_2^6 \frac{1}{x} dx = [\ln x]_2^6 = \ln 6 - \ln 2$
 $= \ln \frac{6}{2} = \ln 3$
 (vi) $\int_{-1}^1 x^3 dx = \frac{1}{4}[x^4]_{-1}^1$
 $= \frac{1}{4}[(1)^4 - (-1)^4] = 0$
- Q. 2.** $\int_0^{\ln 4} e^x dx = [e^x]_0^{\ln 4}$
 $= e^{\ln 4} - e^0$
 $= 4 - 1$
 $= 3$
- Q. 3.** $\int_0^{\frac{\pi}{2}} \cos x dx = [\sin x]_0^{\frac{\pi}{2}}$
 $= \sin \frac{\pi}{2} - \sin 0$
 $= 1$