

Integration practice #2

Write the indefinite integrals

1. $\int (x + 2)(x - 1). dx$

2. $\int \frac{e^x}{5e^x + 20}. dx$

3. $\int \frac{5}{(4 - x)^3}. dx$

4. $\int \sin 3\theta \sin \theta .d\theta$

Calculate the unknown, k :

5. $\int_0^k e^{0.25x}. dx = 5$

6. $\int_0^k \frac{4}{2x + 1}. dx = 1$

7. $\int_0^k \sin 2x .dx = 0.5$

8. $\int_k^3 x^2 - 3 .dx = 2$

Answers: Integration practice #2

Write the indefinite integrals

$$1. \quad \int (x+2)(x-1).dx = \int x^2 + x - 2 .dx + c = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 2x + c$$

$$2. \quad \int \frac{e^x}{5e^x + 20} .dx = \frac{1}{5} \ln |5e^x + 20| + c$$

$$\text{or} \quad = \frac{1}{5} \int \frac{e^x}{e^x + 4} .dx = \frac{1}{5} \ln |e^x + 4| + c$$

$$3. \quad \int \frac{5}{(4-x)^3} .dx = \frac{5}{-2 \times -1} (4-x)^{-2} + c = \frac{5}{2(4-x)^2} + c$$

$$4. \quad \int \sin 3\theta \sin \theta .d\theta = \int \frac{1}{2} \cos 2\theta + \frac{1}{2} \cos 4\theta .d\theta = \frac{1}{4} \sin 2\theta + \frac{1}{8} \sin 4\theta + c$$

Calculate the unknown, k :

$$5. \quad \int_0^k e^{0.25x} .dx = 5 \quad [4e^{0.25x}]_0^k = 5 \quad 4e^{0.25k} - 4e^0 = 5$$

$$0.25k = \ln \frac{9}{4} \quad k = 3.2437$$

$$6. \quad \int_0^k \frac{4}{2x+1} .dx = 1 \quad \left[\frac{4}{2} \ln |2x+1| \right]_0^k = 1 \quad 2 \ln (2k+1) - 2 \ln 1 = 1$$

$$2k+1 = e^{0.5} \quad k = 0.3244$$

$$7. \quad \int_0^k \sin 2x .dx = 0.5 \quad \left[-\frac{1}{2} \cos 2x \right]_0^k = 0.5 \quad -\frac{1}{2} \cos 2k - \frac{-1}{2} \cos 0 = 0.5$$

$$\cos 2k = 0 \quad k = \frac{\pi}{4}$$

$$8. \quad \int_k^3 x^2 - 3 .dx = 2 \quad \left[\frac{1}{3} x^3 - 3x \right]_k^3 = 2 \quad \left(\frac{1}{3} 3^3 - 3 \times 3 \right) - \left(\frac{1}{3} k^3 - 3k \right) = 2$$

$$k^3 - 9k = -6 \quad k = 3.29$$