

Answer on Question #48247 – Math – Integral Calculus

Question.

Find the indefinite integral

$$\int \frac{x}{\sqrt{3-x}} dx = ?$$

Solution.

$$\begin{aligned} \int \frac{x}{\sqrt{3-x}} dx &= \int \frac{x-3+3}{\sqrt{3-x}} dx = -\int \sqrt{3-x} dx + \int \frac{3}{\sqrt{3-x}} dx = -\int \sqrt{3-x} d(3-x) - 3 \int \frac{d(3-x)}{\sqrt{3-x}} = \\ \frac{2}{3}(3-x)^{\frac{3}{2}} - 6\sqrt{3-x} + C &= \frac{2}{3}\sqrt{3-x}(3-x-9) + C = -\frac{2}{3}(x+6)\sqrt{3-x} + C, \text{ where } C \text{ is} \\ &\text{an arbitrary real constant.} \end{aligned}$$

Answer.

$$\int \frac{x}{\sqrt{3-x}} dx = -\frac{2}{3}(x+6)\sqrt{3-x} + C$$