1. Find the following integral,
\[ \int \frac{dx}{x^2 \sqrt{25 - x^2}} \]

**Solution:** First apply the trigonometric substitution \( x = 5 \sin(\theta) \), then \( dx = 5 \cos(\theta) \, d\theta \), and
\[
\int \frac{dx}{x^2 \sqrt{25 - x^2}} = \int \frac{5 \cos(\theta) \, d\theta}{25 \sin^2(\theta) \sqrt{25 - 25 \sin^2(\theta)}} \\
= \frac{1}{25} \int \frac{\cos(\theta) \, d\theta}{\sin^2(\theta) \cos(\theta)} \\
= \frac{1}{25} \int d\theta \\
= \frac{1}{25} \int \csc^2(\theta) \, d\theta \\
= -\frac{1}{25} \cot(\theta) + C
\]

Converting this back to terms of \( x \) gives,
\[
\int \frac{dx}{x^2 \sqrt{25 - x^2}} = -\frac{\sqrt{25 - x^2}}{25x} + C
\]