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## Section 8.3: Trigonometric substitution

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Expression	Substitution	Identity
$\sqrt{a^2 - x^2}$	$x = a \sin t, \quad t \in [-\pi/2, \pi/2]$	$1 - \sin^2 t = \cos^2 t$
$\sqrt{a^2 + x^2}$	$x = a \tan t, \quad t \in (-\pi/2, \pi/2)$	$1 + \tan^2 t = \sec^2 t$
$\sqrt{x^2 - a^2}$	$x = a \sec t, \quad t \in [0, \pi/2) \text{ or } t \in [\pi, 3\pi/2)$	$\sec^2 t - 1 = \tan^2 t$

**Exercise 1.** Evaluate  $\int 5x\sqrt{x^2 - 1} dx$ .

**Exercise 2.** Evaluate  $\int \frac{x^3}{\sqrt{4 - x^2}} dx$ .

**Exercise 3.** (2p476) Evaluate  $\int_0^2 \sqrt{4 - x^2} dx$ .

**Exercise 4.** (7p476) Evaluate  $\int_0^3 \frac{dx}{\sqrt{9 + x^2}}$ .

**Exercise 5.** (5p476) Evaluate  $\int \sqrt{2x - x^2} dx$ .

**Exercise 6.** Evaluate  $\int (5 - 4x - x^2)^{(5/2)} dx$ .

**Exercise 7.** Evaluate  $\int \sqrt{e^{2t} - 9} dt$ .