

Section 7.3 *Trigonometric substitution*

7.3₁

Learning outcomes

After completing this section, you will inshaAllah be able to

1. evaluate *integrals using trigonometric substitutions*

- Mostly used for *integrals involving radicals*
- **Main idea:** Use a substitution to *get rid of radical*

Types of Integrals & corresponding substitutions

	Integrals involving	Substitution	
See example 1 in class	$\sqrt{a^2 - x^2}$	$x = a \sin \theta$	Why? $1 - \sin^2 \theta = \cos^2 \theta$
See example 2 in class	$\sqrt{a^2 + x^2}$	$x = a \tan \theta$	Why? $1 + \tan^2 \theta = \sec^2 \theta$
See example 3 in class	$\sqrt{x^2 - a^2}$	$x = a \sec \theta$	Why? $\sec^2 \theta - 1 = \tan^2 \theta$

Note cases involving other fractional powers like

$\int (a^2 - x^2)^{3/2} dx$ can also be handled with above substitutions

Extension of above ideas

Integrals involving expressions like $ax^2 + bx + c$

Complete the square and use
substitutions similar to above logic

See example 4 done in class

End of Section 7.3