

Integration of Integrals Involving Powers and Products of Trig Functions

1. To find the anti-derivative of an integral involving the product

$\sin^n(x) \cos^m(x)$ where $n =$ an **odd** positive integer

- Convert all but one of the sines to cosines using Pythagorean identity ($\sin^2(x) + \cos^2(x) = 1$)
- Then, use the u-substitution method with $u = \cos(x)$

2. To find the anti-derivative of an integral involving the product

$\sin^n(x) \cos^m(x)$ where $m =$ an **odd** positive integer

- Convert all but one of the cosines to sines using Pythagorean identity ($\sin^2(x) + \cos^2(x) = 1$)
- Then, use the u-substitution method with $u = \sin(x)$

3. To find the anti-derivative of an integral of the form

$\sin^n(x) \cos^m(x)$ where n and m are **both even** integers

- Switch all the sines to cosines or all the cosines to sines
- Then, express the resulting integral in terms of lower powers of sines or cosines. This may be done by integration by parts and the application of the trigonometric identity $\sin^2(x) + \cos^2(x) = 1$ or by use of double angle formulas.