

Lone Cases				
Case Name	Step 1 - Exponent Manipulation	Step 2 - Trigonometric Identities	Step 3	Step 4
Sine-Odd	Manipulate to $\sin(x)(\sin^2(x))^p$	Sine Pythagorean Id.	Let $u=\cos(x)$	
Sine-Even	Manipulate to $(\sin^2(x))^p$	Sine Power-Reducing Id.	Expand and apply integral linearity	Solve cosine cases
Cosine-Odd	Manipulate to $\cos(x)(\cos^2(x))^p$	Cosine Pythagorean Id.	Let $u=\sin(x)$	
Cosine-Even	Manipulate to $(\cos^2(x))^p$	Cosine Power-Reducing Id.	Expand and apply integral linearity	Solve cosine cases
Tangent-Odd	Manipulate to $\tan(x)(\tan^2(x))^p$	Tangent Pythagorean Id.	Expand and apply integral linearity	Solve other cases
Tangent-Even	Manipulate to $(\tan^2(x))^p$	Tangent Pythagorean Id.	Expand and apply integral linearity	Solve secant cases
Cosecant-Odd	Manipulate to $\csc(x)(\csc^2(x))^p$	Cosecant Pythagorean Id.	Expand and apply integral linearity	Solve other cases
Cosecant-Even	Manipulate to $\csc^2(x)(\csc^2(x))^p$	Cosecant Pythagorean Id.	Let $u=\cot(x)$	
Secant-Odd	Manipulate to $\sec(x)(\sec^2(x))^p$	Secant Pythagorean Id.	Expand and apply integral linearity	Solve other cases
Secant-Even	Manipulate to $\sec^2(x)(\sec^2(x))^p$	Secant Pythagorean Id.	Let $u=\tan(x)$	
Cotangent-Odd	Manipulate to $\cot(x)(\cot^2(x))^p$	Cotangent Pythagorean Id.	Expand and apply integral linearity	Solve other cases
Cotangent-Even	Manipulate to $(\cot^2(x))^p$	Cotangent Pythagorean Id.	Expand and apply integral linearity	Solve cosecant cases

$p \in \mathbb{N}_1 = \{1,2,3,4,5,\dots\}$

Pair Cases				
Case Name	Step 1 - Exponent Manipulation	Step 2	Step 3	Step 4
Sine-Odd and Cosine-Even	Manipulate sine powers to $\sin(x)(\sin^2(x))^p$	Sine Pythagorean Id.	Let $u=\cos(x)$	
Sine-Even and Cosine-Odd	Manipulate cosine powers to $\cos(x)(\cos^2(x))^p$	Cosine Pythagorean Id.	Let $u=\sin(x)$	
Sine-Odd and Cosine-Odd	<i>Either two previous cases work</i>			
Sine-Even and Cosine-Even	Manipulate sine powers to $(\sin^2(x))^p$	Sine Pythagorean Id.	Expand and apply integral linearity	Solve cosine cases
Sine-Cosine Same	Manipulate powers to $(\sin(x)\cos(x))^p$	Sine Double-Angle Id.	Solve sine cases	
Secant-Odd and Tangent-Even	Manipulate tangent powers to $(\tan^2(x))^p$	Tangent Pythagorean Id.	Expand and apply integral linearity	Solve secant cases



Pair Cases (cont)

Secant-Even and Tangent-Odd	Manipulate powers to $\sec(x)\tan(x)\sec^p(x)\tan^q(x)$	Manipulate tangent powers to $(\tan^2(x))^r$	Tangent Pythagorean Id.	Let $u=\sec(x)$
Secant-Odd and Tangent-Odd	<i>Same as previous case</i>			
Secant-Even and Tangent-Even	Manipulate secant powers to $\sec^2(x)(\sec^2(x))^p$	Secant Pythagorean Id.	Let $u=\tan(x)$	
Secant-Tangent Same	<i>Same as previous two cases</i>			
Cosecant-Odd and Cotangent-Even	Manipulate cotangent powers to $(\cot^2(x))^p$	Cotangent Pythagorean Id.	Expand and apply integral linearity	Solve cosecant cases
Cosecant-Even and Cotangent-Odd	Manipulate powers to $\csc(x)\cot(x)\csc^p(x)\cot^q(x)$	Manipulate cotangent powers to $(\cot^2(x))^r$	Cotangent Pythagorean Id.	Let $u=\csc(x)$
Cosecant-Odd and Cotangent-Odd	<i>Same as previous case</i>			
Cosecant-Even and Cotangent-Even	Manipulate cosecant powers to $\csc^2(x)(\csc^2(x))^p$	Cosecant Pythagorean Id.	Let $u=\cot(x)$	
Cosecant-Cotangent Same	<i>Same as previous two cases</i>			

$p, q, r \in \mathbb{N}_1 = \{1, 2, 3, 4, 5, \dots\}$

Pythagorean Identities

Sine Pythagorean	$\sin^2(x) = 1 - \cos^2(x)$
Cosine Pythagorean	$\cos^2(x) = 1 - \sin^2(x)$
Tangent Pythagorean	$\tan^2(x) = \sec^2(x) - 1$
Cosecant Pythagorean	$\csc^2(x) = \cot^2(x) + 1$
Secant Pythagorean	$\sec^2(x) = \tan^2(x) + 1$
Cotangent Pythagorean	$\cot^2(x) = \csc^2(x) - 1$
Sine-Cosine Pythagorean	$1 = \sin^2(x) + \cos^2(x)$
Secant-Tangent Pythagorean	$1 = \sec^2(x) - \tan^2(x)$
Cosecant-Cotangent Pythagorean	$1 = \csc^2(x) - \cot^2(x)$

Reduction Formulas

$\int \sin^n(x) dx, n \geq 2$	$-\cos(x)\sin^{n-1}(x)/n + (n-1)/n \int \sin^{n-2}(x) dx$
$\int \cos^n(x) dx, n \geq 2$	$\cos(x)\sin^{n-1}(x)/n + (n-1)/n \int \cos^{n-2}(x) dx$
$\int \tan^n(x) dx, n \geq 2$	$\tan^{n-1}(x)/(n-1) - \int \tan^{n-2}(x) dx$
$\int \csc^n(x) dx, n \geq 2$	$-\csc^{n-2}(x)\cot(x)/(n-1) + ((n-2)/(n-1)) \int \csc^{n-2}(x) dx$
$\int \sec^n(x) dx, n \geq 2$	$\sec^{n-2}(x)\tan(x)/(n-1) + ((n-2)/(n-1)) \int \sec^{n-2}(x) dx$
$\int \cot^n(x) dx, n \geq 2$	$-\cot^{n-1}(x)/(n-1) - \int \cot^{n-2}(x) dx$

$$n \in \mathbb{N}_1 = \{1, 2, 3, 4, 5, \dots\}$$

Miscellaneous Information

Binomial Expansion	$(a+b)^n = \sum_{k=0}^n \binom{n}{k} a^{n-k} b^k$
Integral Linearity Property: Sum and Difference	$\int (f(x) \pm g(x)) dx = \int f(x) dx \pm \int g(x) dx$
$\int \tan(x) dx$	$\ln \sec(x) + C$
$\int \cot(x) dx$	$\ln \sin(x) + C$
$\int \sec(x) dx$	$\ln \sec(x) + \tan(x) + C$
$\int \sec^3(x) dx$	$\frac{1}{2}(\sec(x)\tan(x) + \ln \sec(x) + \tan(x)) + C$
$\int \csc(x) dx$	$\ln \csc(x) - \cot(x) + C$
$\int \csc^3(x) dx$	$-\frac{1}{2}(\csc(x)\cot(x) + \ln \csc(x) - \cot(x)) + C$

$\binom{n}{k}$ are the binomial coefficients, equal to $n!/(k!(n-k)!)$

$$n, k \in \mathbb{N}_1 = \{1, 2, 3, 4, 5, \dots\}$$

