

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 $(\sin^2(x))^p$	Manipulate to $\sin(x)$	Sine Pythagorean Id.	Let $u=\cos(x)$
Sine-Even and Cosine-Odd	Manipulate sine powers to $\cos(x)(\cos^2(x))^p$	Manipulate to $\cos(x)$	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	



Pair Cases (cont)				
Secant-Odd and Tangent-Even	Manipulate tangent powers to $(\tan^2(x))^p$	Tangent Pythagorean Id.	Expand and apply integral linearity	Solve secant cases
Secant-Even and Tangent-Odd	Manipulate powers to $\sec(x)\tan^p(x)\tan^q(x)$	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 $\csc(x)\cot^p(x)\cot^q(x)$	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  $n!/(k!(n-k)!)$

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

