USING TRIGONOMETRIC IDENTITIES

The following are identities that you should know:

$\boldsymbol{sin(A \pm B)}$	**=**
$\boldsymbol{cos(A \pm B)}$	**=**
$\boldsymbol{tan(A \pm B)}$	**=**
$\boldsymbol{sin\, 2A}$	**=**
$\boldsymbol{cos\, 2A}$	**=**
$\boldsymbol{cos\, 2A}$	**=**
$\boldsymbol{cos\, 2A}$	**=**
$\boldsymbol{tan\, 2A}$	**=**
$\boldsymbol{sec^2 A}$	**=**
$\boldsymbol{cosec^2 A}$	**=**

We can use these identities to transform an expression that *cannot* be integrated into one that *can* be integrated.

These first examples focus on manipulation of the identities rather than integration.

Examples

1) $sin\, 4x =$

2) $2\, sin\, 3x \cos 3x =$

3) $cos\, 5x =$

4) $4\, cos^2 3x - 2 =$

SKILL #3: Integrating using Trig Identities

Some expressions, such as $\sin^2 x$ and $\sin x \cos x$ can't be integrated directly, but we can use one of our trig identities to replace it with an expression we can easily integrate.

Q Find $\int \sin^2 x \ dx$

Q Find $\int \sin 3x \cos 3x \ dx$

Q Find $\int \cos^2 x \ dx$

Q Find $\int \tan^2 x \ dx$

Check Your Understanding

Q Find $\int (\sec x + \tan x)^2 \ dx$

Q Find $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sin^2 3x \ dx$

Further examples

Show that

$$\int_{\frac{\pi}{12}}^{\frac{\pi}{8}} \boldsymbol{sin^2 x\, dx} = \frac{\boldsymbol{\pi}}{\boldsymbol{48}} + \frac{\boldsymbol{1-\sqrt{2}}}{\boldsymbol{8}}$$

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