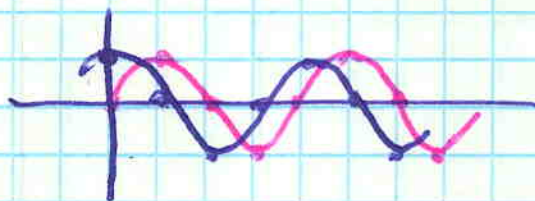


5-1-3

Combining Fractions Conjugates

Cofunction

translation function



$$\sin x = \cos x \left(\frac{\pi}{2} - x \right)$$

$$\cos x = \sin x \left(\frac{\pi}{2} - x \right)$$

* trick: $A - B \xrightarrow{\text{Factor } -1} -1(-A + B)$
 $= -(B - A)$

~~1~~ $1 - \sin^2 x \rightarrow -(\sin^2 x - 1)$

$$\cos \left(x - \frac{\pi}{2} \right) = -\cos \left(\frac{\pi}{2} - x \right)$$

5-1-3 Combining Fractions

Common Denominator

Conjugates

Ex 6. Common Denominator

Simplify $\frac{\sin x \cos x}{1 - \sin x} \leftarrow \frac{1 + \sin x}{\cos x}$

$$= \frac{\sin x \cos x \cos x - (1 + \sin x)(1 - \sin x)}{(1 - \sin x)(\cos x)}$$

$$= \frac{\sin x \cos^2 x - (1 - \sin^2 x)}{(1 - \sin x)(\cos x)} \quad \text{Pythag!}$$

$$s^2 + c^2 = 1$$

$$-s^2 - s^2$$

$$A - B$$

$$= \frac{\sin x (\cos^2 x - \cos^2 x)}{(1 - \sin x)(\cos x)}$$

$$= -1(-A + B)$$

$$= -(B - A)$$

$$= \frac{\cos^2 x (\sin x - 1)}{\cos x (1 - \sin x)}$$

$$\frac{\cos x (\sin x - 1)}{-(\sin x - 1)} = \boxed{-\cos x}$$

Using the conjugate

~~Trig~~ Trig conjugate:

denominator is $| \pm u$ or $u \pm 1$

you can multiply numerator & denominator by the conjugate

$$\frac{(1+u)(1-u)}{1^2-u^2}$$

$$\frac{(u+1)(u-1)}{u^2-1}$$

Ex 7 Rewrite $\frac{1}{1+\cos x}$

$$\frac{1}{1+\cos x} \cdot \frac{(1-\cos x)}{(1+\cos x)} = \frac{1-\cos x}{1-\cos^2 x}$$

$$\frac{1-\cos x}{1-\cos^2 x}$$

$$= \frac{1-\cos x}{\sin^2 x}$$

$$\frac{1}{\sin^2 x} - \frac{\cos x}{\sin^2 x}$$

$$\csc^2 x - \frac{\cos x}{\sin x} \cdot \frac{1}{\sin x}$$

$$\csc^2 x - \tan x \csc x$$

$$\text{or } \csc x (\csc x - \tan x)$$

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