Precalculus

Lesson 7.5: Sum and Difference Formulas

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We continue with our study of more trigonometric identities:

Sum and Difference Formlas

$$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$
$$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$

$$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$
$$\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$

$$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$
$$\tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

The sum and difference identities may be used to find the exact value of angles not found on the unit circle.

$\cos 75°$	$\cos\frac{\pi}{12}$
$\sin\frac{7\pi}{12}$	$\sin 80°\cos 20° - \cos 80°\sin 20°$

Given: $\sin\alpha = \frac{4}{5}$, $\pi < \alpha < \frac{\pi}{2}$ and

$\sin\beta = -\frac{2\sqrt{5}}{5}$, $\pi < \beta < \frac{3\pi}{2}$

find $\cos\alpha$

$\cos\beta$

$\cos(\alpha + \beta)$

$\sin(\alpha + \beta)$

Establish the identities (prove):

$$\frac{\cos(\alpha - \beta)}{\sin\alpha \sin\beta} = \cot\alpha \cot\beta + 1$$

$$\tan(\theta + \pi) = \tan\theta$$

$$\tan\left(\theta + \frac{\pi}{2}\right) = -\cot\theta$$

Find the exact value of:

$$\sin\left(cos^{-1}\frac{1}{2} + sin^{-1}\frac{3}{5}\right)$$