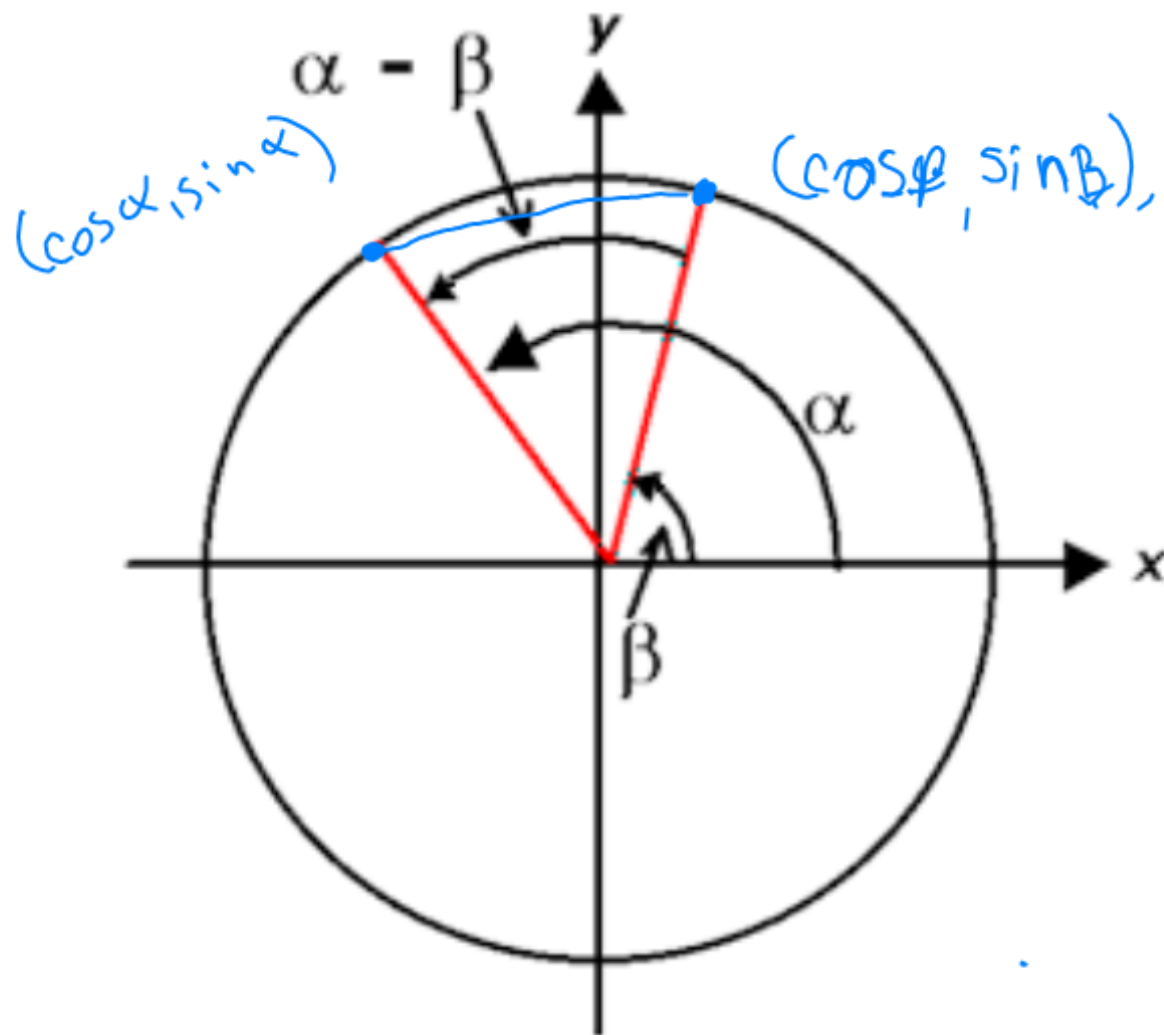


10.1 Formulas for $\cos(\alpha \pm \beta)$ and $\sin(\alpha \pm \beta)$



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

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

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

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

Example: Simplify-do not evaluate.

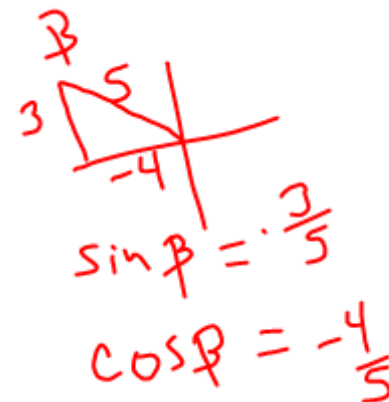
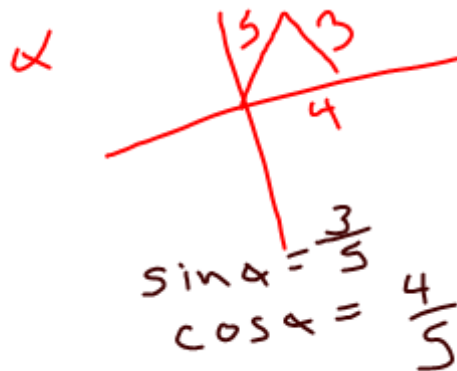
$$\sin 20^{\circ} \cos 15^{\circ} - \cos 20^{\circ} \sin 15^{\circ} = \sin (20^{\circ} - 15^{\circ})$$

$\sin 5^{\circ}$

Example: Find the exact value of

$$\cos(\alpha + \beta) \text{ if } \sin \alpha = \frac{3}{5}, \cos \beta = -\frac{4}{5}$$

α in quadrant I and β in quad II.



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

$$\frac{4}{5} \cdot -\frac{4}{5} - \frac{3}{5} \cdot \frac{3}{5}$$

$$-\frac{16}{25} - \frac{9}{25} = -1$$

Example: Find the exact value of $\cos 15^\circ$.

$$\cos(45 - 30) = \cos 45 \cos 30 + \sin 45 \sin 30$$
$$\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2}$$

$$\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$$

$$\frac{\sqrt{6} + \sqrt{2}}{4}$$

Example: Verify:

$$\sin \theta = \cos(\pi/2 - \theta)$$

$$\cos \frac{\pi}{2} \cos \theta + \sin \frac{\pi}{2} \cdot \sin \theta$$

$$0 \cdot \cos \theta + 1 \cdot \sin \theta$$

$$\sin \theta$$

cos formula

evaluate

Example: Verify:

$$\tan x + \cot y = \frac{\cos(x - y)}{\cos x \sin y}$$

$$\frac{\cos x \cos y + \sin x \sin y}{\cos x \sin y}$$

formula

break into
2 fractions

$$\frac{\cos x \cos y}{\cos x \sin y} + \frac{\sin x \sin y}{\cos x \sin y}$$

simplify

$$\frac{\cos y}{\sin y} + \frac{\sin x}{\cos x}$$

$$\cot y + \tan x$$

quotient

Pg 373 1, 4, 7, 9, 14, 17, 21, 26, 27, 29, 34