Precalculus 115, section 7. 2 Trig Addition & Subtraction Formulae

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For this section, we introduce four new identities, which you'll need to memorize.

$$\sin(s+t) = \sin s \cos t + \cos s \sin t$$

$$\sin(s-t) = \sin s \cos t - \cos s \sin t$$

$$\cos(s+t) = \cos s \cos t - \sin s \sin t$$

$$\cos(s-t) = \cos s \cos t + \sin s \sin t$$

Your text also has formulas for tangent, but my recommendation is that you not memorize these. Instead, find sine and cosine values, then use the definition of tangent.

Example A: Find the exact values of $\sin \dfrac{17\pi}{12}$, $\cos \dfrac{17\pi}{12}$ and $\tan \dfrac{17\pi}{12}$.

Example B: Write $\cos 70° \cos 40° + \sin 70° \sin 40°$ as a trigonometric function of one number, and then find its exact value.

Example C: Prove the identity $\sin(x+y) + \sin(x-y) = 2 \sin x \cos y$.

Example D: Prove the identity $\cos(x+y)\cos(x-y) = \cos^2 x - \sin^2 y$.

For Example E, we'll need a formula from your text, one which you don't need to memorize.

For real numbers A and B, $A\sin x + B\cos x = k\sin(x+\phi)$, where $k = \sqrt{A^2 + B^2}$ and ϕ satisfies

$$\cos\phi = \frac{A}{\sqrt{A^2 + B^2}} \text{ and } \sin\phi = \frac{B}{\sqrt{A^2 + B^2}}.$$

Example E: Express the function $g(x) = \cos 2x + \sqrt{3}\sin 2x$ in terms of sine only, then sketch the graph of the function.