Precalculus preAP name: ___________________________________
Sum & Difference Formulas date: ____________________________________

Summary

Sum and Difference Formulas

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

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

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

Find the formula above such that ONE SIDE of the formula matches the problem exactly. Set this equal to the OTHER side of the formula and simplify and evaluate. This is a way you can use identities.

1. $\sin 20° \cos 10° + \cos 20° \sin 10°$
2. $\sin 20° \cos 80° - \cos 20° \sin 80°$
3. $\cos 70° \cos 20° - \sin 70° \sin 20°$
4. $\cos 40° \cos 10° + \sin 40° \sin 10°$

Use the given conditions **and** your reference triangle knowledge **and** your "matching" smarts to find the exact value of each of the following WITHOUT a calculator.

True Conditions for #5 - #8: $\sin\alpha = \frac{3}{5}$, $0 < \alpha < \frac{\pi}{2}$ and $\cos\beta = \frac{2\sqrt{5}}{5}$, $-\frac{\pi}{2} < \beta < 0$

5. $\sin\ (\alpha+\beta)$ 6. $\cos\ (\alpha+\beta)$ 7. $\sin\ (\alpha-\beta)$ 8. $\tan\ (\alpha-\beta)$

True Conditions for #9 - #12: $\sin\theta = \frac{1}{3}$, θ is in quadrant II.

9. $\cos\theta$ 10. $\sin(\theta + \frac{\pi}{6})$ 11. $\cos\ (\theta - \frac{\pi}{3})$ 12. $\tan\ (\theta + \frac{\pi}{4})$

13. Using your identities, prove that $\sin\theta + \frac{\cot\theta}{\sec\theta} = \csc\theta$. Don't forget to work DOWN with "=" signs on your paper.

ANSWER BANK:

$-\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{2\sqrt{5}}{5}$	0
$\frac{9-4\sqrt{2}}{7}$	$\frac{11\sqrt{5}}{25}$	$\frac{1}{2}$	$\frac{\sqrt{3}-2\sqrt{2}}{6}$
$\frac{\sqrt{3}-2\sqrt{2}}{6}$	$-\frac{2\sqrt{2}}{3}$	2	$\frac{2\sqrt{5}}{25}$