

REVIEW—SUM/DIFFERENCE IDENTITIES

NAME \_\_\_\_\_

#1-6. Using the sum & difference identities, condense each of the following and express as a trig function of a single angle.

1.  $\sin 97^\circ \cos 43^\circ + \cos 97^\circ \sin 43^\circ$

2.  $\cos 72^\circ \cos 130^\circ + \sin 72^\circ \sin 130^\circ$

3.  $\frac{\tan 140^\circ - \tan 60^\circ}{1 + \tan 140^\circ \tan 60^\circ}$

4.  $\sin \frac{\pi}{5} \cos \frac{2\pi}{3} - \cos \frac{\pi}{5} \sin \frac{2\pi}{3}$

5.  $\cos \frac{\pi}{6} \cos \frac{\pi}{7} - \sin \frac{\pi}{6} \sin \frac{\pi}{7}$

6.  $\frac{\tan \frac{\pi}{3} + \tan \frac{\pi}{4}}{1 - \tan \frac{\pi}{3} \tan \frac{\pi}{4}}$

#7-8. Use the sum & difference identities with unit circle values to find exact answers for the following:

7.  $\tan(-105^\circ)$

8.  $\sin 345^\circ$

#9-11. Given:  $\csc \alpha = \frac{13}{5}$ ,  $\frac{\pi}{2} \leq \alpha \leq \pi$ , and  $\tan \beta = -\frac{3}{4}$ ,  $\frac{3\pi}{2} \leq \beta \leq 2\pi$ , find the following:

9.  $\sin(\alpha - \beta)$

10.  $\cos(\beta + \alpha)$

11.  $\tan(\alpha - \beta)$

#12-13. If  $\sin \theta = -\frac{3}{5}$  and  $\theta$  is in the third quadrant, find the following:

12.  $\cos(\theta + \frac{\pi}{3})$

13.  $\tan 2\theta$

#14-18. Verify the following identities.

14.  $\sin(\pi - x) = \sin x$

15.  $\sin(\frac{3\pi}{2} + x) = -\cos x$

16.  $\cos(30^\circ - x) + \cos(30^\circ + x) = \sqrt{3} \cos x$

17.  $\frac{\sin(\beta - \alpha)}{\sin \alpha \sin \beta} = \cot \alpha - \cot \beta$

18.  $\cos(\alpha + \beta) + \cos(\alpha - \beta) = 2 \cos \alpha \cos \beta$

#19-21. Solve each of the following equations over the interval  $[0, 2\pi)$ .

19.  $\sin\left(x + \frac{\pi}{6}\right) - \sin\left(x - \frac{\pi}{6}\right) = \frac{1}{2}$

20.  $\tan(x + \pi) + 2\sin(x + \pi) = 0$

21.  $\sin\left(x + \frac{\pi}{2}\right) - \cos\left(x + \frac{3\pi}{2}\right) = 0$

Answers: 1.  $\sin 140^\circ$       2.  $\cos 58^\circ$       3.  $\tan 80^\circ$       4.  $-\sin\left(\frac{7\pi}{15}\right)$

5.  $\cos\left(\frac{13\pi}{42}\right)$       6.  $\tan \frac{7\pi}{12}$       7.  $2 + \sqrt{3}$       8.  $\frac{\sqrt{2} - \sqrt{6}}{4}$       9.  $-\frac{16}{65}$

10.  $-\frac{33}{65}$       11.  $\frac{16}{63}$       12.  $\frac{-4 + 3\sqrt{3}}{10}$       13.  $\frac{24}{7}$       19.  $\frac{\pi}{3}, \frac{5\pi}{3}$

20.  $0, \pi, \frac{\pi}{3}, \frac{5\pi}{3}$       21.  $\frac{\pi}{4}, \frac{5\pi}{4}$