

**Part 1: 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.  $\frac{\tan \frac{\pi}{3} + \tan \frac{\pi}{4}}{1 - \tan \frac{\pi}{3} \tan \frac{\pi}{4}}$

**Part 2: Use the sum & difference identities with unit circle values to find exact answers for the following:**

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

8.  $\sin 345^\circ$

**Part 3: 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.  $\tan(\alpha - \beta)$

**Part 4: Solve each of the following equations over the interval  $[0, 2\pi)$ .**

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

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

**Answers:**

1.  $\sin 140^\circ$     2.  $\sin 58^\circ$     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.  $0, \pi, \frac{\pi}{3}, \frac{5\pi}{3}$     13.  $\frac{\pi}{4}, \frac{5\pi}{4}$