Name: _____   Date: _____

4.4 Compound Angle Formulas

1. Use an appropriate compound angle formula to express as a single trigonometric function, and then determine an exact value for each.

   a) $\sin\dfrac{\pi}{3}\cos\dfrac{\pi}{6}+\cos\dfrac{\pi}{3}\sin\dfrac{\pi}{6}$

   b) $\cos\dfrac{\pi}{3}\cos\dfrac{5\pi}{12}-\sin\dfrac{\pi}{3}\sin\dfrac{5\pi}{12}$

   c) $\sin\dfrac{5\pi}{9}\cos\dfrac{7\pi}{18}-\cos\dfrac{5\pi}{9}\sin\dfrac{7\pi}{18}$

   d) $\cos\dfrac{5\pi}{12}\cos\dfrac{\pi}{4}+\sin\dfrac{5\pi}{12}\sin\dfrac{\pi}{4}$

2. Apply a compound angle formula, and then determine an exact value for each.

   a) $\cos\left(\dfrac{3\pi}{4}-\dfrac{\pi}{6}\right)$

   b) $\sin\left(\dfrac{5\pi}{4}-\dfrac{2\pi}{3}\right)$

   c) $\cos\left(\dfrac{5\pi}{6}+\dfrac{4\pi}{3}\right)$

3. Angle x is in the first quadrant and angle y is in the second quadrant such that $\cos x = \dfrac{12}{13}$ and $\sin y = \dfrac{7}{25}$.
   Determine an exact value for
   a) $\sin x$
   b) $\cos y$
   c) $\sin (x + y)$
   d) $\sin (x - y)$
   e) $\cos (x + y)$
   f) $\cos (x - y)$

4. Use an appropriate compound angle formula to determine an exact value for each.

   a) $\sin\dfrac{11\pi}{12}$

   b) $\cos\dfrac{25\pi}{12}$

5. Angle b lies in the second quadrant such that $\cos b = -\dfrac{3}{5}$.
   a) Determine an exact answer for $\sin b$ and $\tan b$.
   b) Determine an exact answer for $\cos 2b$.
   c) Determine an exact answer for $\sin 2b$.
   d) Determine an exact answer for $\tan 2b$.
   e) Use a calculator to determine an approximate measure for b, in radians, to two decimal places.
   f) In which quadrant does angle $2b$ lie? Justify your answer.

6. a) Use the half-angle formula
   $$\sin\dfrac{x}{2}=\pm\sqrt{\dfrac{1-\cos x}{2}}\ \text{ to find }\ \sin\dfrac{\pi}{12}.$$
   b) Check your answer to part a) by using another method to find $\sin\dfrac{\pi}{12}$.