Precalculus: Trig Assignment #1

Answer the following questions without a calculator on graph paper.

1. State all transformations, the period and amplitude and graph each of the following for $-\pi \le x \le 2\pi$ and state the domain and range.

   a) $y = \sin 2x + 1$ c) $y = \sin\left(x - \frac{\pi}{6}\right)$ e) $y = -\sin(-x)$

   b) $y = -3\cos x$ d) $y = \cos(2x - \pi)$ f) $y = 2\cos x - 1$

2. Sketch the following for $-\pi \le x \le \pi$ and determine the coordinates of all points of intersection:

   a) $\begin{cases} y = \sin x \\ y = 1 \end{cases}$ b) $\begin{cases} y = \cos x \\ y = 1 \end{cases}$ c) $\begin{cases} y = \sin x \\ y = 0 \end{cases}$ d) $\begin{cases} y = \cos x \\ y = -\frac{1}{2} \end{cases}$

3. Convert θ to an angle in standard position, in radians (to three decimal places where appropriate), for $0 \le \theta < 2\pi$:

   a) $\theta = 330^\circ$ c) $\theta = 800^\circ$ e) θ = 1.26 rev

   b) $\theta = -225^\circ$ d) θ = due south f) $\theta = 15^\circ$ W of S

4. State a positive and negative coterminal angle for each of the following:

   a) $\frac{2\pi}{3}$ b) 12 rad c) $-\frac{5\pi}{2}$

5. For each, sketch θ in standard position and determine θ_{ref}:

   a) $\theta = \frac{4\pi}{9}$ b) $\theta = -\frac{5\pi}{3}$ c) $\theta = 2.5$ d) $\theta = -\frac{19\pi}{3}$

6. Sketch a triangle for each of the following and state the remaining trig ratios:

   a) $\cot\theta = \frac{\sqrt{3}}{3}$ b) $\sin^{-1}\frac{8}{17} = \theta$ c) $\cos\theta = \frac{a}{b}$

7. Evaluate the following exactly without a calculator. Show all work.

   a) $\tan^{-1}\sqrt{3}$ b) $\sin\left(\tan^{-1}\frac{5}{12}\right)$ c) $\sec\left(\cos^{-1}\frac{a}{b}\right)$

   d) $\csc\left(\cos^{-1}\frac{a}{b}\right)$ e) $\cot\left(\frac{\pi}{2} - \tan^{-1}\frac{7}{8}\right)$ f) $\tan^2\frac{8\pi}{9} - \sec^2\frac{8\pi}{9}$

g) $\sin\frac{\pi}{3}\sec\frac{\pi}{6}$ h) $\sin\frac{5\pi}{18}\sec\frac{2\pi}{9}$ i) $\cos\frac{\pi}{5}\csc\frac{3\pi}{10}$

j) $\cot^2\frac{\pi}{7}+\sec\frac{3\pi}{5}\cos\frac{3\pi}{5}-\cot\left[\tan^{-1}\left(\sqrt{\sin\frac{\pi}{6}}\right)\right]-\csc^2\frac{\pi}{7}$

8. Given that $\cos\alpha=\frac{3}{4}$, evaluate

a) $\sec\alpha$ b) $\sin\left(\frac{\pi}{2}-\alpha\right)$ c) $1-\sin^2\alpha$

9. The *x*-coordinate of a point on a unit circle is $\frac{\sqrt{5}}{6}$.
   a) Determine all possible *y*-coordinates and sketch the resulting terminal arms. Label θ in standard position for each arm.
   b) State all 6 trig ratios of (each) θ.

10. The *y* - coordinate of a point on a circle of radius 2 (with center at the origin) is -1.
   a) Determine all possible *x*-coordinates and sketch the resulting terminal arms. Label θ in standard position for each arm.
   b) State all 6 trig ratios of (each) θ.

11. Evaluate the following using your calculator. Explain each result using a triangle diagram and the definitions of the trig ratios.

a) $\sin^{-1}\frac{3}{2}$ b) $\sec^{-1}\frac{1}{4}$

12. What must be true for the value $\frac{a}{h}$ in $\cos^{-1}\frac{a}{h}$? Explain.

13. State the first four values of θ of each expression, starting with $n = 0$:

a) $\theta = n\pi,\ n\in I$ b) $\theta=(2n+1)\frac{\pi}{2},\ n\in I$ c) $\theta=\frac{2\pi}{3}+2n\pi,\ n\in I$

14. Use the triangle given below and the fact that cotangent is the reciprocal of tangent to derive the cofunction identity $\tan\alpha=\cot\left(\frac{\pi}{2}-\alpha\right)$. Use proper proof format.