Do these without a calculator. Review material for Trigonometry are posted at:

http://www3.nd.edu/~m10350/pre-req.html

1. Using the equilateral triangle and right isosceles triangle, determine all trigonometric ratios of the special angles $\pi/6$, $\pi/4$ and $\pi/3$. Fill in your answers below.

Hint: Label the equal legs of the right isosceles triangle length 1. Label all sides of the equilateral triangle length 2.

\[
\begin{align*}
\text{sin} \left( \frac{\pi}{4} \right) &= \\
\text{cos} \left( \frac{\pi}{4} \right) &= \\
\text{tan} \left( \frac{\pi}{4} \right) &= \\
\text{sin} \left( \frac{\pi}{3} \right) &= \\
\text{cos} \left( \frac{\pi}{3} \right) &= \\
\text{tan} \left( \frac{\pi}{3} \right) &= \\
\text{sin} \left( \frac{\pi}{6} \right) &= \\
\text{cos} \left( \frac{\pi}{6} \right) &= \\
\text{tan} \left( \frac{\pi}{6} \right) &= 
\end{align*}
\]

2. Fill in the sign of trigonometric value of angle $\theta$ in the indicated quadrant.

<table>
<thead>
<tr>
<th></th>
<th>1st Quadrant</th>
<th>2nd Quadrant</th>
<th>3rd Quadrant</th>
<th>4th Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>sin $\theta$</td>
<td>+</td>
<td></td>
<td></td>
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<tr>
<td>cos $\theta$</td>
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<td></td>
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<tr>
<td>tan $\theta$</td>
<td></td>
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</tbody>
</table>

3. Circle the correct sign for the following trigonometric values.

3a. $\cos \left( \frac{5\pi}{4} \right)$ is positive? negative?  
3b. $\sin \left( -\frac{3\pi}{4} \right)$ is positive? negative?  
3c. $\cos \left( -\frac{\pi}{3} \right)$ is positive? negative?  
3d. $\tan \left( \frac{13\pi}{6} \right)$ is positive? negative?
4. Without using a calculator, answer the questions below:

4a. Which quadrant is \( \frac{5\pi}{4} \) in? Answer: ________________

4b. What is the reference angle of \( \frac{5\pi}{4} \)? Answer: ________________

(Recall: The reference angle is the acute angle between terminal edge and horizontal axis.)

4c. Write down the trigonometric values of \( \frac{5\pi}{4} \) in terms of the trigonometric values of its reference angle. Indicate clearly the sign.

\[
\sin \left( \frac{5\pi}{4} \right) = \\
\cos \left( \frac{5\pi}{4} \right) = \\
\tan \left( \frac{5\pi}{4} \right) =
\]

4d. Using 4(c), write down the exact trigonometric values of \( \frac{5\pi}{4} \).

\[
\sin \left( \frac{5\pi}{4} \right) = \\
\cos \left( \frac{5\pi}{4} \right) = \\
\tan \left( \frac{5\pi}{4} \right) =
\]

5. Using the steps in Q4 above, write down the exact values of the following trigonometric values.

\[
\sin \left( -\frac{3\pi}{4} \right) = \\
\cos \left( -\frac{3\pi}{4} \right) = \\
\tan \left( -\frac{3\pi}{4} \right) =
\]

\[
\sin \left( -\frac{\pi}{3} \right) = \\
\cos \left( -\frac{\pi}{3} \right) = \\
\tan \left( -\frac{\pi}{3} \right) =
\]

\[
\sin \left( \frac{13\pi}{6} \right) = \\
\cos \left( \frac{13\pi}{6} \right) = \\
\tan \left( \frac{13\pi}{6} \right) =
\]
6. Solve the following equations **without a calculator**.

6a. \( \sin(x) = -\frac{1}{2} \) for \( 0 < x < 2\pi \)

6b. \( \sin(x) = -\frac{1}{2} \) for \( -\pi < x < \pi \)

6c. \( \cos(x) = \frac{\sqrt{3}}{2} \) for \( -\frac{\pi}{2} < x < \frac{\pi}{2} \)

6d. \( \tan(x) = 1 \) for \( -2\pi < x < 2\pi \)