You have 50 minutes to complete this test. You must show all work to receive full credit. Each question is worth the indicated value, for a total of 100 points possible. You may also earn 5 bonus points from the bonus problem. If you have any questions, please come to the front and ask.

1. (24 points) Complete this chart, using exact values:

<table>
<thead>
<tr>
<th>θ</th>
<th>sinθ</th>
<th>cosθ</th>
<th>tanθ</th>
<th>cscθ</th>
<th>secθ</th>
<th>cotθ</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2π</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>225°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1</td>
</tr>
<tr>
<td>π</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. (10 points) Sketch at least one period of $y = -2\cos\left(\frac{1}{2}x + \frac{\pi}{2}\right)$ on the axes below. Label your graph clearly, showing all relevant information.
3. (8 points) Convert $38^\circ 12' 16''$ to radians, and express your answer as a decimal correct to 4 places.

4. (8 points) A boat is spotted from a lighthouse that is 100 ft tall. If the angle of depression from the top of the lighthouse to the boat is $2^\circ$, how far is the boat from the base of the lighthouse?

5. (10 points) Show that $\sec x (\csc x + 1) = \frac{1 + \sin x}{\cos x \sin x}$.

6. (8 points) Circle True or False -- Mark answers CLEARLY.
   
a) $\cos 30^\circ \sec 30^\circ = 1.$  
   TRUE  FALSE

b) $120^\circ$ and $-30^\circ$ are complementary angles.  
   TRUE  FALSE

c) $\csc(-x) = -\csc(x).$  
   TRUE  FALSE

d) $\sin 72^\circ = \cos 18^\circ.$  
   TRUE  FALSE
(12 points) If \( \sin \alpha = \frac{4}{7} \) and \( \cos \alpha < 0 \), find the exact values of the following:

a) \( \cos \alpha \)

b) \( \tan \alpha \)

c) \( \csc \alpha \)

d) \( \sec \alpha \)

e) \( \cot \alpha \)

f) \( \sin(90^\circ - \alpha) \)

(10 points) On the interval \([-2,4]\), sketch \( f(x) = \tan\left(\frac{\pi}{2} x - \frac{\pi}{2}\right) + 1 \). Label your graph clearly, showing all relevant information.