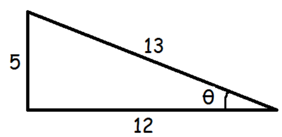
Math 171 Group Worksheet over Trigonometry (1.4) Name ____________________
September 5, 2017
Credit given for work shown.

1. Let $\tan(\theta) = 2$ and $\sec(\theta) = -\sqrt{5}$.

   (a) What quadrant is θ in? ______
   (b) $\sin(\theta) =$ ______
   (c) $\cos(\theta) =$ ______
   (d) $\cot(\theta) =$ ______
   (e) $\csc(\theta) =$ ______

<u>Useful identities</u>: $\cos(x + y) = \cos x \cos y - \sin x \sin y$ $\quad$ $\sin(x + y) = \sin x \cos y + \cos x \sin y$

2. Use the addition formula (above) and the triangle (below) to compute $\sin\left(\frac{2\pi}{3} + \theta\right)$ exactly.



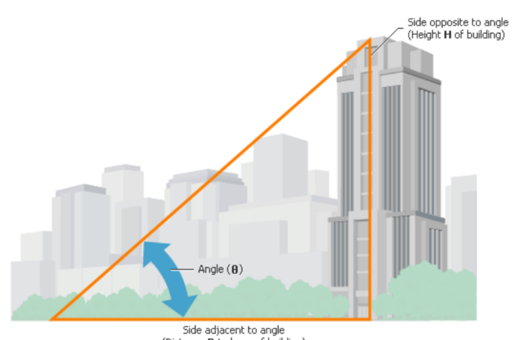
3. Find <u>all</u> solutions to $\sqrt{3}\sin(x) - \sin(2x) = 0$ in the interval $[0, 2\pi]$. (Hint: Use formula above.)

4. How can we measure the height of a tall building or monument? The following technique used by surveyors is an interesting application of trig. The surveyor stands a fixed distance D from the monument and measures the angle θ to its top.

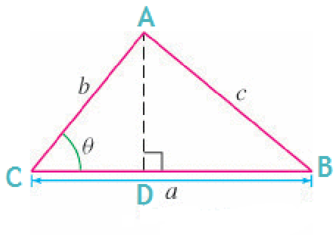
   (a) Express the height H of the monument in terms of the angle of elevation θ and D.

   (b) Express the distance D to the monument in terms of the angle of elevation θ and height H.

   (c) The height of the Statue of Liberty is 305 feet. If the measured angle of elevation is $\pi/3$, then how far away is the surveyor?



5. Determine the height of the triangle in terms of b and θ. Use this value to determine the area of the triangle in terms of a, b and θ.



6. Steel is melted to fill a rectangular container measuring 2 ft x 2 ft x 1 ft and then poured into ingots by tilting the container at an angle θ as illustrated. In the process, it is important to control the rate of turning so that a constant pour rate into the ingots is achieved. Express the total volume V poured into the ingots as a function of the angle θ. You may have to express the volume using a piecewise function.