7.1) Solve Trig Graphically
- must use calculator on trig = polynomial
  no general solution.
- regular trig
  - 1 general solution
    - when \( \tan \theta \)
    - or when \( \sin \theta \) or \( \cos \theta \) equals max or min
      or center line \( (y=0) \) (solution repeats \( \frac{\pi}{6} \))

\[
\begin{array}{c}
\cos \theta \\
\hline
\hline
y=1 & y=-1
\end{array}
\]

\[
\text{Solution has } \pm \pi n, n \in \mathbb{Z} \\
\text{period is still } 2\pi
\]

- otherwise 2 general solutions

7.2) Solve Algebraically
- increasing trig degree will add solutions.
- with higher degree, convert trig to poly so that
  you can factor or use quadratic formula
  Important - convert factors back to trig and
  continue solving.
- look for special ratios to give exact answers.

7.3) Reciprocal & Quotient Identities
Simplify - use reciprocals so that there is no
  denominator.
Proving - work with one side only!
  - start with \( \text{"LHS = "} \) or \( \text{"RHS = "} \) then end
    with \( \text{"= RHS"} \) or \( \text{"= LHS"} \)
  - don’t skip steps, and recall algebra.
- solve equations, prove identities.
- use common denominator when combining terms.
  - multiply by the reciprocal if fractional denominator
    \[
    \text{eg) } \frac{1}{x-\frac{1}{x}} \text{ can’t reciprocate } \Rightarrow \text{ can reciprocate.}
    \]
7.4) Pythagorean Identities
- copy from notes
- convert all to \( \sin \theta \) & \( \cos \theta \) when stuck.
- multiply by conjugates when you see them in the denominator b/c things will cancel.
- use identity to convert eqn into \( \sin \theta \) or \( \cos \theta \) with higher degree (2) trig, then factor.
  \[ \sin \theta = \cos^2 \theta + \frac{1}{2} \]
  \[ \sin \theta = (1-\sin^2 \theta) + \frac{1}{2} \]
  \[ \sin^2 \theta + \sin \theta - \frac{1}{2} = 0 \]
  now factor q.e.d.

7.5) Sum & Difference Idents.
- copy from notes
- for exact ratios use sum/diff of 2 special angles that are non-axes: \( 30^\circ, 45^\circ, 60^\circ \)
  \[ 255^\circ = (180^\circ + 75^\circ) \] doesn't help.
  \[ 195^\circ = 240^\circ - 45^\circ \]
- don't put ratio back into trig fns. with ident.
  \[ \sin (235^\circ/2) = \sin \left( \frac{7\pi}{4} \right) \cos \frac{\pi}{6} \]
  \[ = -\frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{2} = -\frac{\sqrt{6}}{4} \]
  \[ \sin \left( \frac{7\pi}{4} \right) = \cos \left( \frac{\pi}{4} \right) \]
  \[ \cos \left( \frac{\pi}{4} \right) = \sin \left( \frac{\pi}{2} \right) \]
  \[ \sin \frac{\pi}{2} = 1 \]

7.6) Double Angle Identities
- copy from notes
- use ident to get rid of double angles, then solve/prove.
- use identity to get exact answers
- take time to replace \( \cos \theta \) appropriately

Final Caution: Never:
\[ \sin^2 \theta + \cos^2 \theta = \_ \]
\[ \sin^2 \theta \text{ vs } \sin 2\theta \]
never: \( \sin^2 2\theta \) halfway.