Assignments for the Week of Oct. 3

- Read 6.6, 7.1
- 45 minutes of Khan Academy
- Textbook assignment due Friday 10/14:
  6.5 #25-55 odd Inverse Trig Functions
  6.6 #1-21 odd Solving Trig Equations
  #61-83 odd

- Upcoming:
- 7.1 Law of Sines
- 7.2 Law of Cosines

$x \in [0, 2\pi)$

20. $\tan^2 x + \tan x - \sqrt{3} = \sqrt{3}\tan x$

$\underbrace{\tan^2 x + \tan x} \underbrace{- \sqrt{3} - \sqrt{3}\tan x} = 0$

$\tan x(\tan x + 1) - \sqrt{3}(1 + \tan x) = 0$

$(\tan x + 1)(\tan x - \sqrt{3}) = 0$

$\tan x + 1 = 0 \qquad \tan x - \sqrt{3} = 0$

$\tan x = -\frac{1}{1} \qquad \tan x = \frac{\sqrt{3}}{1}$

$x = \frac{3\pi}{4}, \frac{7\pi}{4} \qquad x = \frac{\pi}{3}, \frac{4\pi}{3}$

22. $\cos^4 x = \cos^2 x$

$\cos^4 x - \cos^2 x = 0$

$\cos^2 x(\cos^2 x - 1) = 0$

$\cos^2 x = 0$; $\cos^2 x - 1 = 0$

$\cos x = 0$ $\quad \cos^2 x = 1$

$\cos x = \pm 1$

$x = \pi/2, 3\pi/2$ $\quad x = 0, \pi$

HAVE YOU SEEN ME?

$\boxed{\cos^2 x = 0}$

last seen Mon 10/10/16

UPDATE: FOUND!

New Directions: <u>Find ALL the solutions</u> (not just in $[0,2\pi)$)

62. $\sec 3x - \frac{2\sqrt{3}}{3} = 0$

$\sec 3x = \frac{2\sqrt{3}}{3}$

$\sec 3x = \frac{2}{\sqrt{3}}$

$\cos 3x = \frac{\sqrt{3}}{2}$

$3x = \frac{\pi}{6} + 2\pi k$

$x = \frac{\pi}{18} + \frac{2\pi}{3}k$

$3x = \frac{11\pi}{6} + 2\pi k$

$x = \frac{11\pi}{18} + \frac{2\pi}{3}k$

68. $\cos\left(2x - \frac{\pi}{4}\right) = -\frac{\sqrt{2}}{2}$

$\cos\left(2x - \frac{\pi}{4}\right) = -\frac{1}{\sqrt{2}}$

$2x - \frac{\pi}{4} = \frac{3\pi}{4} + 2\pi k$; $2x - \frac{\pi}{4} = \frac{5\pi}{4} + 2\pi k$

$2x = \pi + 2\pi k$ $\qquad$ $2x = \frac{3\pi}{2} + 2\pi k$

$x = \frac{\pi}{2} + \pi k$ $\qquad$ $x = \frac{3\pi}{4} + \pi k$

$x \in [0, 2\pi)$

$\cos(4x) = \frac{1}{\sqrt{2}}$

$4x = \frac{\pi}{4}, \frac{7\pi}{4}; \frac{9\pi}{4}, \frac{15\pi}{4}; \frac{17\pi}{4}, \frac{23\pi}{4}; \frac{25\pi}{4}, \frac{31\pi}{4}$

$x = \frac{\pi}{16}, \frac{7\pi}{16}, \frac{9\pi}{16}, \frac{15\pi}{16}, \frac{17\pi}{16}, \frac{23\pi}{16}, \frac{25\pi}{16}, \frac{31\pi}{16}$

Solve for $x \in [0, 2\pi)$.

$(\sin x - \cos x)^2 = (1)^2$

$(a-b)^2 =$
$(a-b)(a-b) =$
$a^2 - 2ab + b^2$

$\cancel{(\sin x - \cos x)(\sin x + \cos x) = 1\,(\sin x + \cos x)}$
$\cancel{\sin^2 x - \cos^2 x = \sin x + \cos x}$
$\cancel{\sin^2 x - \sin x - \cos^2 x - \cos x = 0}$
$\cancel{\sin x(\sin x - 1) - \cos x(\cos x + 1) = 0}$

CAUTION! squaring both sides may introduce extraneous solutions!

$x = 1$
$x^2 = 1$
$\Rightarrow x = \pm 1$

$\sin^2 x - 2\sin x\cos x + \cos^2 x = 1$

$\boxed{\sin^2 x + \cos^2 x} - \boxed{2\sin x\cos x} = 1$

$1 - \sin 2x = 1$

$0 = \sin 2x$

$2x = 0, \pi; 2\pi, 3\pi$

$x = \cancel{0}, \boxed{\frac{\pi}{2}}, \boxed{\pi}, \cancel{\frac{3\pi}{2}}$

CHECK $\sin x - \cos x = 1$

$\sin 0 - \cos 0 = 0 - 1 = -1 \neq 1$

$\sin \pi/2 - \cos \pi/2 = 1 - 0 = 1 \checkmark$

$\sin \pi - \cos \pi = 0 - (-1) = 1 \checkmark$

$\sin \frac{3\pi}{2} - \cos \frac{3\pi}{2} = -1 - 0 = -1 \neq 1$