Math 112

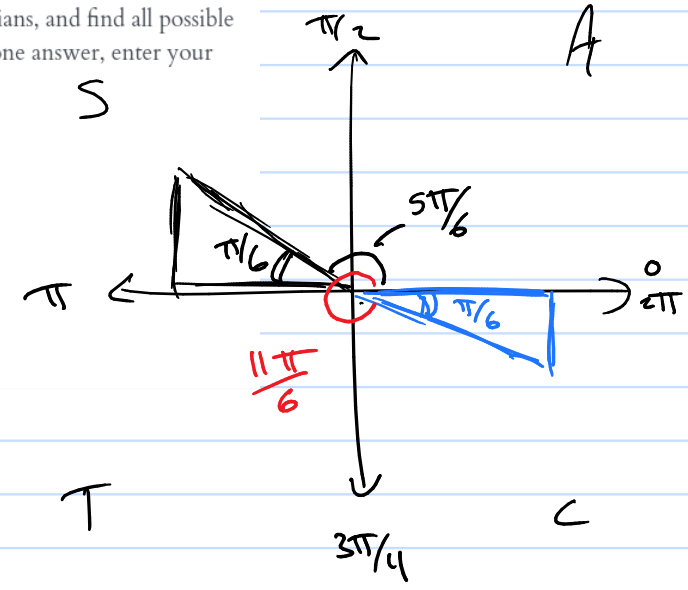
Q's

1 Solve the equations below exactly. Give your answers in radians, and find all possible values for t in the interval $0 \le t \le 2\pi$. If there is more than one answer, enter your solutions in a comma separated list.

(a) $\sin(t) = \frac{\sqrt{3}}{2}$ when $t =$ ____

(b) $\cos(t) = -\frac{\sqrt{2}}{2}$ when $t =$ ____

(c) $\tan(t) = -\frac{1}{\sqrt{3}}$ when $t =$ $5\pi/6, 11\pi/6$



angle	sin θ	cos θ	tan θ
0	0	1	0
π/6	1/2	√3/2	√3/3 = 1/√3
π/4	√2/2	√2/2	1
π/3	√3/2	1/2	√3
π/2	1	0	—

$2\pi - \frac{\pi}{6}$

$= \frac{12\pi}{6} - \frac{\pi}{6} = \frac{11\pi}{6}$

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7 Find all solutions of the equation $\sec 4x - 2 = 0$.

The answer is $A + \frac{k}{2}\pi$ and $B + \frac{k}{2}\pi$ where k is any integer and $0 < A < B < \pi/2$,

$A =$ $\pi/12$,

$B =$ $5\pi/12$.

$\sec 4x - 2 = 0$

$\sec(4x) = 2$

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

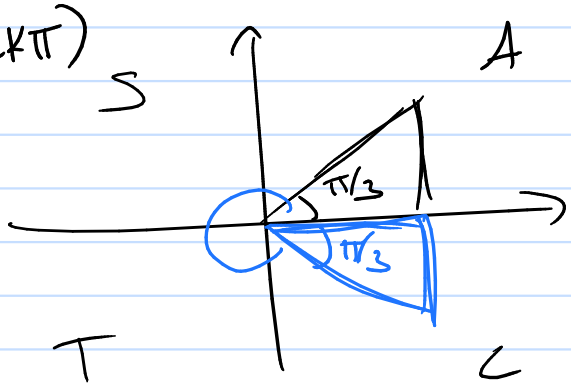
$\cos(4x) = \frac{1}{2}$

$4x = \pi/3$ or $4x = \frac{5\pi}{3}$

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

$\frac{1}{4}(4x) = \frac{1}{4}\left(\frac{\pi}{3} + 2k\pi\right)$ or $\frac{1}{4}(4x) = \frac{1}{4}\left(\frac{5\pi}{3} + 2k\pi\right)$

$\boxed{x = \frac{\pi}{12} + \frac{k\pi}{2}}$ $\boxed{x = \frac{5\pi}{12} + \frac{k\pi}{2}}$



4 $2\cos(x)\sin(x) - \cos(x) = 0$

polynomial like → factor $(\cos x)(2\sin x - 1) = 0$

Find all angles in radians that satisfy the equation. For each solution enter first the angle solution in $[0, 2\pi)$ then the period. When 2 or more solutions are available enter them in increasing order of the angles. (e.g. $x = \pi/2 + 2k\pi$ or $x = 3\pi/2 + 2k\pi$ etc.)
Note: You are not allowed to use decimals in your answer.

$x =$ [ ] + [ ]

or

$x =$ [ ] + [ ]

or

$x =$ [ ] + [ ]

or

$x =$ [ ] + [ ]

$\cos x = 0$

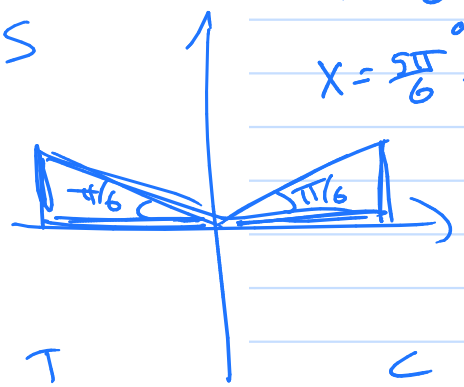
$x = \frac{\pi}{2} + 2n\pi$

$x = \frac{3\pi}{2} + 2n\pi$

$2\sin x - 1 = 0$

$\sin x = \frac{1}{2}$

$x = \pi/6 + 2n\pi$ or $x = \frac{5\pi}{6} + 2n\pi$



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ex $4\cos x \sin x - 2\sin x + 2\cos x = 1$

$(4\cos x \sin x - 2\sin x) + (2\cos x - 1) = 0$

$2\sin x(2\cos x - 1) + (2\cos x - 1) = 0$

$(2\sin x + 1)(2\cos x - 1) = 0$

$2\sin x + 1 = 0$ $\quad$ $2\cos x - 1 = 0$

$\sin x = -1/2$ $\quad$ $\cos x = 1/2$

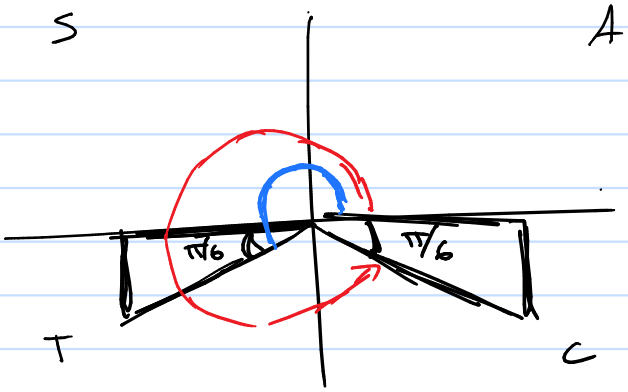
Factor by Grouping example

$(4uv - 2v) + (2u - 1)$

$2v(2u-1) + (2u-1)$

$(2v+1)(2u-1)$

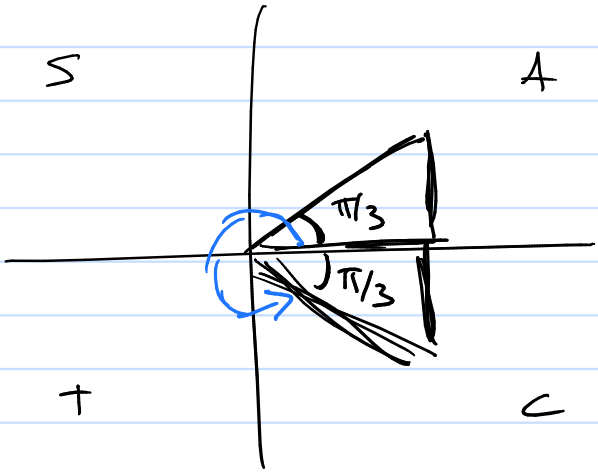
$\sin x = -1/2$



$x = \frac{7\pi}{6} + 2n\pi$

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

$\cos x = 1/2$



$x = \frac{\pi}{3} + 2n\pi$

$x = \frac{5\pi}{3} + 2n\pi$

$2\pi - \pi/3$

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ex 10.6 Inverse Trig

angle / ratio

$\arcsin(\text{ratio}) = \text{angle}$

vs

$\sin(\text{angle}) = \text{ratio}$

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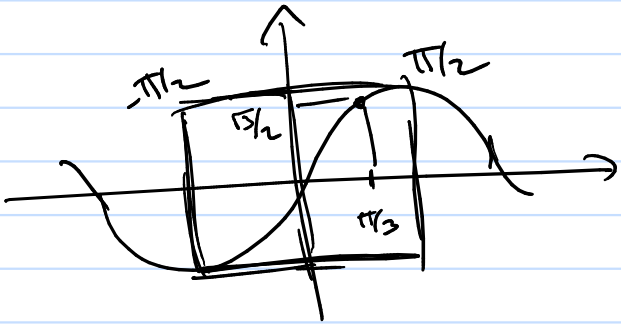
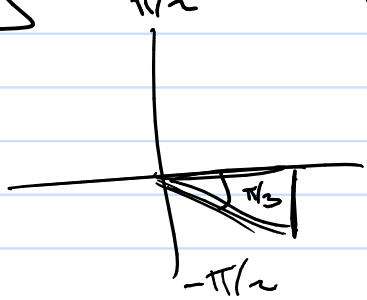
ex $\arcsin(-\sqrt{3}/2) =$

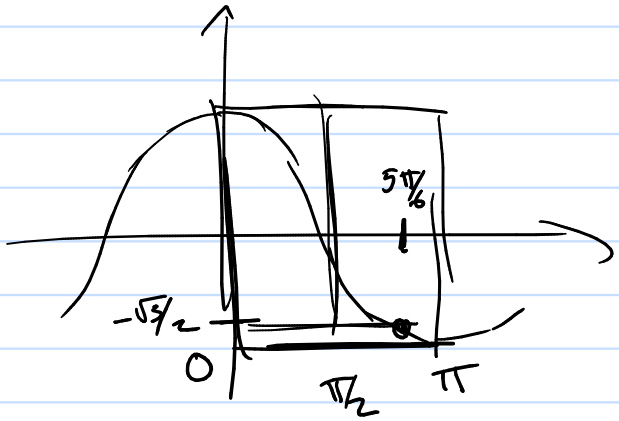
$-\pi/3$

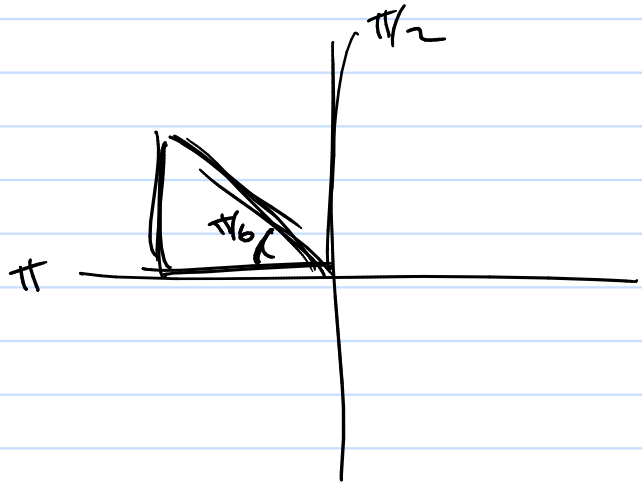




(ex) $\arccos\left(-\sqrt{3}/2\right)$

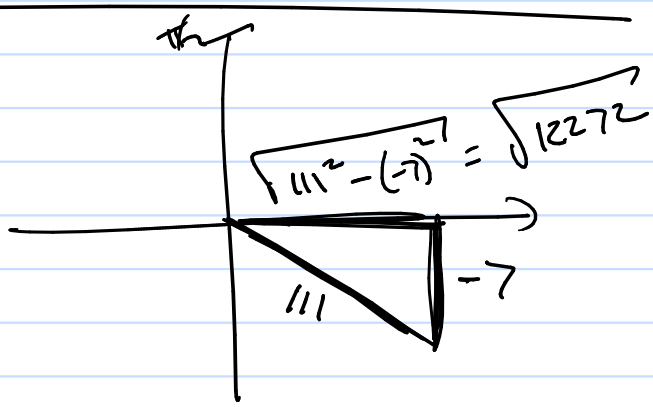
$= \frac{5\pi}{6}$





(ex) $\tan\left(\arcsin\left(-\frac{7}{111}\right)\right)$

$\tan\left(\arcsin\left(-\frac{7}{111}\right)\right) = \boxed{\frac{-7}{\sqrt{12272}}}$



$\sec\left(\arcsin\left(-\frac{7}{111}\right)\right) = \frac{111}{\sqrt{12272}} = \frac{\text{hyp}}{\text{adj}}$ $-\pi/2$

$$\begin{array}{r} 12\overset{\sim}{8}21 \\ -\quad 49 \\ \hline 12272 \end{array}$$

$$\sin\left(\arctan\left(-\frac{3}{2}\right)\right) = \frac{-3}{\sqrt{13}}$$