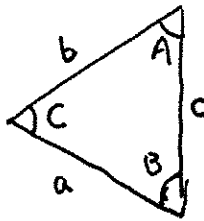


You may use your homework solutions. I need to look at your class notes while you take this. You are allowed a 3x5 inch card of formulas. Thanks! 2pts per problem.

Problem 1: Simplify $\cos 41x \sin x + \sin 41x \cos x = \sin(41x+x) = \boxed{\sin(42x)}$

Problem 2: If a triangle has interior angles $A = 10^\circ$, $B = 50^\circ$, $C = 120^\circ$ and the length of the side opposite A has length $a = 3$ then find the length of side b opposite B and the length of c opposite C . *hint: use the law of sines.*

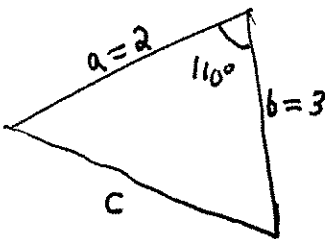


$$\frac{\sin(10^\circ)}{3} = \frac{\sin(50^\circ)}{b} = \frac{\sin(120^\circ)}{c}$$

$$b = \frac{\sin(50^\circ)}{\sin(10^\circ)}(3) \approx \boxed{13.23}$$

$$c = \frac{\sin(120^\circ)}{\sin(10^\circ)}(3) \approx \boxed{14.96}$$

Problem 3: A triangle has side lengths $a = 2$, $b = 3$ and the angle between sides a, b is 110° . Find the length of the remaining side. *hint: use the law of cosines.*

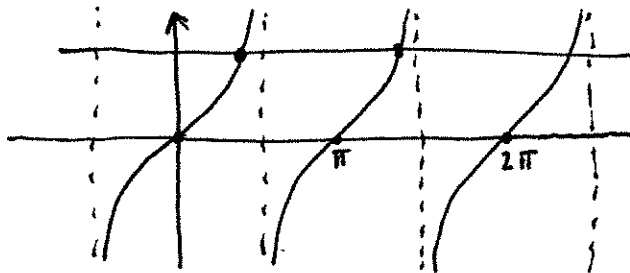


$$c^2 = a^2 + b^2 - 2ab \cos(110^\circ)$$

$$c^2 = 4 + 9 - 2(2)(3) \cos(110^\circ)$$

$$c = \sqrt{13 - 12 \cos 110^\circ} \approx \boxed{4.14}$$

Problem 4: Solve $\tan x = \sqrt{3}$ for $x \in [0, 2\pi)$



$y = \sqrt{3}$ Expect two solutions

$$\tan(x) = \sqrt{3}$$

$$x = \tan^{-1}(\sqrt{3}) = \pi/3$$

to obtain 2nd solution, recall $\tan(x+n\pi) = \tan(x) \forall n \in \mathbb{Z}$.
We see from graph, solⁿ's are $x = \frac{\pi}{3}, \frac{\pi}{3} + \pi$

$$\boxed{x = \frac{\pi}{3}} \text{ and } \boxed{x = \frac{4\pi}{3}}$$

$$\underline{\sec^3(x) - \sec(x) = \sec(x) [\sec^2(x) - 1] = \sec(x) \tan^2(x)}$$

Problem 5: Simplify $\sec^3 x + \tan^2 x \sec x$.

$$\underline{\tan^2 x + 1 = \sec^2 x}$$

$$\begin{aligned} \sec^3(x) + \sec(x) \tan^2(x) &= \sec(x) [\sec^2(x) + \tan^2(x)] \\ &= \sec(x) [\tan^2 x + 1 + \tan^2 x] \\ &= \underline{\sec(x) [2 \tan^2 x + 1]}. \quad (\text{many correct answers here.}) \end{aligned}$$

Problem 6: Solve $-2 \cos^2 x - 3 \sin x + 3 = 0$ for $x \in [0, 2\pi)$

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

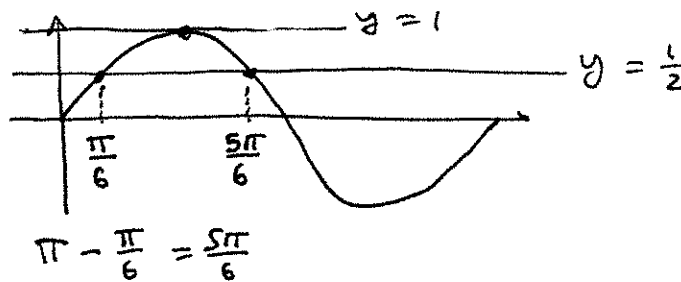
$$2(\sin^2 x - 1) - 3 \sin x + 3 = 0$$

$$2 \sin^2 x - 3 \sin x + 1 = 0$$

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

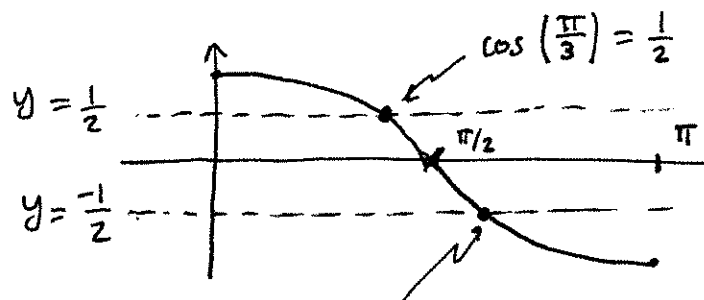
$$\sin x = \frac{1}{2} \Rightarrow \boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$$

$$\sin x = 1 \Rightarrow \boxed{x = \frac{\pi}{2}}$$



Problem 7: Solve $\sec^2 \theta = 4$ for $\theta \in [0, \pi)$.

$$\frac{1}{\cos^2 \theta} = 4 \Rightarrow \cos^2 \theta = \frac{1}{4} \Rightarrow \underline{\cos \theta = \pm \frac{1}{2}}$$



$$\pi - \frac{\pi}{3} = \frac{2\pi}{3}$$

$$\therefore \boxed{\theta = \frac{\pi}{3} \text{ or } \frac{2\pi}{3}}$$