Simplify each of the following. Show your steps neatly organized.

1. $(\cot x)(\sin x) = $ _____

2. $(\cos x)(\cot x + \tan x) = $ _____

3. $(\sec x)(\cot x) = $ _____

4. $\csc x - (\cos x)(\cot x) = $ _____

5. $\dfrac{1 - \cot x}{\tan x - 1} = $ _____

6. $\dfrac{(\sin x)(\csc x)}{\cot x} = $ _____

Prove each of the following identities. Show your steps neatly organized.

7. $\dfrac{\sin x}{1 - \cos x} = \csc x + \cot x$

8. $\dfrac{\sin x - \cot x}{\cos x} = \tan x - \csc x$

Find all solutions of the following equations. No calculators please.

9. $\tan x + 1 = 0$

10. $\cos^2 x + \cos x = 0$

11. $\sec^2 x = \sec x + 2$

12. $4\cos^2 x - 3 = 0$

Find all solutions of the following equations in the interval $[0, 2\pi)$. No calculators please.

13. $2\cos^2 x = 2 + \sin x$

14. $2\cos x - \sec x = 0$

15. $2\sin(2x) = 1$

Find all solutions of the following equations in the interval $[0, 2\pi)$. Express your solutions in radians rounded to 4 significant digits.

16. $4\cos^2 x + 4\cos x - 3 = 0$

17. $3\sin^2 x - 7\sin x + 1 = 0$