

High School Math Problems
2017
Week 10
Problem and Solution

Solve the equation

$$\sin x - \sin x \cos x + \cos x = 1.$$

Solution:

We have that

$$\begin{aligned}\sin x - \sin x \cos x + \cos x &= 1 \\ \sin x (1 - \cos x) - (1 - \cos x) &= 0 \\ (1 - \cos x) (\sin x - 1) &= 0.\end{aligned}$$

Therefore we have that

$$\begin{aligned}\text{either } \cos x = 1 & \quad \text{or } \sin x = 1 \\ x = 2k\pi, k \in \mathbb{Z} & \quad x = \frac{\pi}{2} + 2k\pi, k \in \mathbb{Z}.\end{aligned}$$

Thus the solution to the equation is

$$x = 2k\pi, \frac{\pi}{2} + 2k\pi, k \in \mathbb{Z}.$$