

20 – Solving trigonometric equations

1. Consider the equation $\tan^2 x - 3 = 0$. Find all solutions to the equation that lie in $[0, 2\pi)$.

2. Consider the equation $\cot x \sin^2 x = \cot x$. Find *all* solutions to the equation and also find those solutions that lie in $[0, 2\pi)$.

3. Consider the equation $2 \cos^2 x - 7 \cos x - 4 = 0$. Find *all* solutions to the equation and also find those solutions that lie in $[0, 2\pi)$.

Hint: the equation is of the form $2y^2 - 7y - 4 = 0$. Try factoring.

4. Consider the equation $\sin^2 x = 2 + 2 \cos x$. Find *all* solutions to the equation and also find those solutions that lie in $[0, 2\pi)$.

Hint: first try using a Pythagorean identity to convert $\sin^2 x$ to cosines—then factor.

5. Consider the equation $2 \cos(2x) - \sqrt{3} = 0$. Find *all* solutions to the equation and also find those solutions that lie in $[0, 2\pi)$.

Hint: try the substitution $\theta = 2x$.

6. Consider the equation $-1 + \sin\left(\frac{x}{3}\right) = 0$. Find *all* solutions to the equation and also find those solutions that lie in $[0, 2\pi)$.