# Lesson 22

Read Chapter 20

Inverse trigonometric sinusoidal functions

How to solve $A\sin(\frac{2\pi}{B}(x-C))+D=E$ (minimum $\leq x \leq$ maximum)

1. $\sin(\frac{2\pi}{B}(x-C))=\frac{E-D}{A}=F$
2. $\theta_1=(\frac{2\pi}{B})(x_1-C)=\arcsin F$ . $x_1=\frac{B}{2\pi}\arcsin(F)+C$ This is the principal solution. It is an angle $-\frac{B}{4}+C\leq x_1\leq\frac{B}{4}+C$
3. All values $x_1+Bk$, $k=0,1,2,\cdots,-1,-2\cdots$ are also solutions.
4. $x_2=2C+\frac{B}{2}-x_1$ is the symmetric solution. It is an angle $\frac{B}{4}+C\leq x_2\leq\frac{3B}{4}+C$
5. All values $x_2+Bk$, $k=0,1,2,\cdots,-1,-2\cdots$ are also solutions.

Solve $3\sin(\frac{2\pi}{5}(x-\frac{7}{4})+2=\frac{7}{2}$

Assume the depth of the shore at Neah Bay is given by
$d(t) = 12\sin(\frac{\pi}{6}(t-3)) + 15$. $t$ is measured in hours , d in feet.
What is the maximum depth of the beach and when is it reached ?
When is the minimum depth and when is it reched ?

Find all times $t$ with $0 \leq t \leq 23$ when the beach is 23 feet wide

Find all times $t$ with $0 \leq t \leq 23$ when the beach is [illegible] feet wide