Chapter 6 Section 7
MA1032 Data, Functions & Graphs

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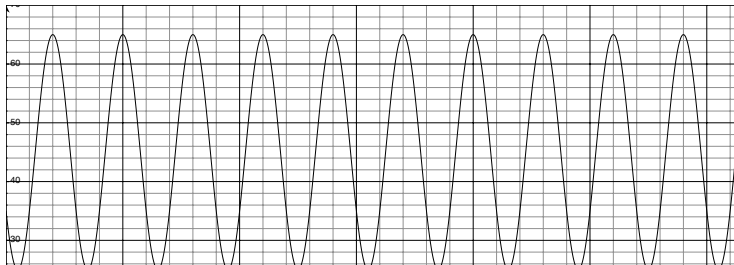
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The air temperature (°F) above a frozen lake during the month of June is given by a sinusoidal function $L(t) = 20\sin(\frac{\pi}{6}(t-5)) + 45$, where t represents the hours elapsed since 12:00am June 1. The lake will begin to break up after 100 hours of 60° thaw time; you can only count time periods when the temperature is at least 60.° When will the ice break up?

Some Theory

The inverse of $f(x) = \sin x$ is $f^{-1}(x) = \sin^{-1}(x)$ where the range is $\frac{-\pi}{2} \leq f(x) \leq \frac{\pi}{2}$.

The inverse of $f(x) = \cos x$ is $f^{-1}(x) = \cos^{-1}(x)$ where the range is $0 \leq f(x) \leq \pi$.

The inverse of $f(x) = \tan x$ is $f^{-1}(x) = \tan^{-1}(x)$ where the range is $\frac{-\pi}{2} \leq f(x) \leq \frac{\pi}{2}$.

- $\sin^{-1}(x)$ means inverse sine
- $(\sin(x))^{-1}$ means $\frac{1}{\sin x}$

They are not the same!

Compute $\cos(\frac{3\pi}{2})$ and $\cos^{-1}(\cos(\frac{3\pi}{2}))$. Explain what happened.
Compute $\cos^{-1}(2)$. Explain what has happened.

Back to the Ice

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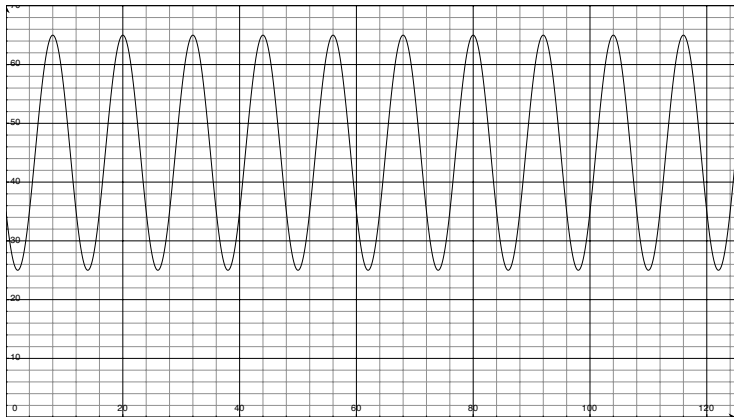
Practice

Solve for x.

- $\sin(x - \frac{\pi}{2}) = \frac{1}{3}$
- $\sin(x + \frac{\pi}{6}) = -1$

Summary

- Inverses of sine, cosine & tangent
- Restrictions to the domain and range.
- Finding ALL solutions to an inverse problem.