5.4 Equations and Graphs of Trigonometric Functions

Example 1: Solve algebraically:

Solve algebraically $0 \leq x < 2\pi$

a.) $2\sin^2(2x) - 1 = 0,$

b.) $10 = 6\cos\frac{\pi}{4}x + 8$

c.) $-5 = 3\sin\pi(x - 4) - 3$

Example 2:

On a typical day at an oceanport, the water has a maximum depth of 20m at 8:00 am. The minimum depth of 12 occurs 6.2h later. Assume the relationship between the depth of water and time is a sinusoidal function.

a.) Sketch the relationship for one period.

b.) Write an equation for the depth of the water at any time, *t* hours.

Example 3:

A Ferris wheel has a radius of 28m. Its center is 30m above the ground. It rotates once every 24s. Suppose you start at the bottom at $t = 0$.

a.) Sketch the relationship for one period.

b.) Write an equation that expresses your height as a function of time.

c.) How high will you be after 15 seconds?

Example 4:

The monthly sales of a product are approximate by:

$S = 400 + 240 \sin \frac{\pi t}{3}$ where t is the time in months. In a year, when does the product exceed 520 units?