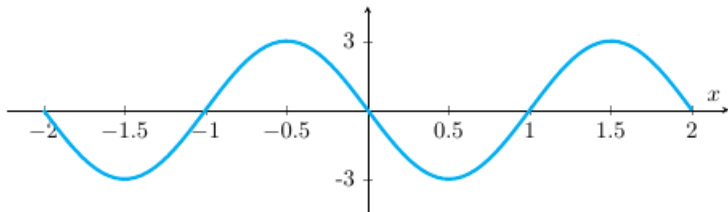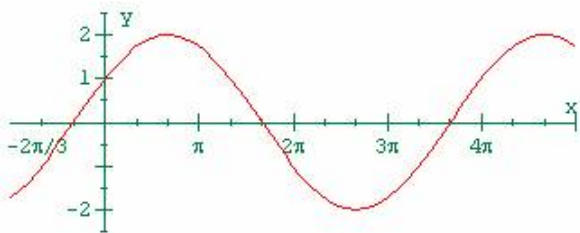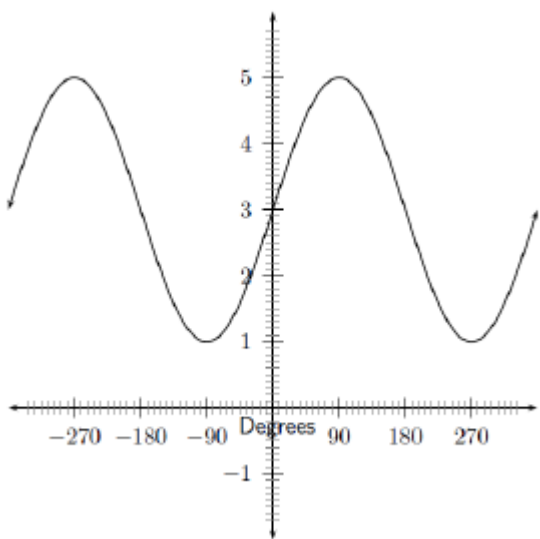# Worksheet 23 - Lesson 66

1. Write a possible sinusoidal function in terms of both sine and cosine for each of the following graphs:

(a)

(b)

(c)

2. The Bay Fundy in Canada has the largest tides in the world. The difference between low and high water levels is 15 meters. At a particular point the depth of the water, y meters, is given as a function of time, t, in hours since midnight by $y = A \cos B(t - C) + D$.

   (a) What is the physical meaning of D?

   (b) What is the value of A?

   (c) What is the value of B, assuming the time between successive high tides is 12.4 hours?

   (d) What is the physical meaning of C?

3. At high tide, the water level is 10 feet below a pier. At low tide the water level is 26 feet below the pier. Also at $t = 0$ the water level is 18 feet below the pier and falling, until it reaches the first low tide at $t = 3$. Assuming sinusoidal behavior, find a formula $y = f(t)$ for the water level relative to the pier at time t (in hours). Sketch the graph.

4. The following function describes the air temperature in Fairbanks, Alaska as a function of time,

$$T(t) = 37 \sin \left(\frac{2\pi}{365} t - 1.7386 \right) + 25$$

   in and t in days. Determine this function's amplitude, average value, maximum, minimum, period, and the phase shift. Include units and a practical description of each quantity

5. Consider $f(x) = \log(5x + 22) + 8$

   (a) What is the domain?

   (b) What is the range?

   (c) What is the vertical asymptote?

   (d) What is the exact y-intercept?

   (e) What is the exact zero?

   (f) List the transformations in order to get from $y = \log x$ to $f(x) = \log(5x + 22) + 8$.

   (g) If $(a, 10)$ is a point on the graph of $f(x)$, then what is a?

6. Let $f(x) = -4\ln(Bx + 9)$

   (a) Determine the value of B so that $x = 2$ is a vertical asymptote.

   (b) Determine the value of B so that 8 is the x-intercept.

   (c) Solve the equation in terms of B: $f(x) = -12$.