MA115 :: Section 5.3 and 5.4 Graphs of Trig Functions

Objective: We will graph the sine, cosine, and tangent functions and their basic transformations.

Warm-up 1 Find the amplitude, period and phase shift of the function and graph one complete period.

$$y = 5\cos\left(3x - \frac{\pi}{4}\right)$$

APPLICATIONS

1. The (often cold) north winds often cause waves on Lake Superior that are big enough to surf (and sink ships). Due to the size difference the period of Lake Superior waves is often shorter than the period of ocean waves. If the functions below model the height in feet above shorline at time t of both Superior waves and ocean waves, which one is more likely to correspond to Lake Superior?

$$h_1(t) = 10\cos\left(\frac{\pi}{10}t\right) \text{ and } h_2(t) = 10\cos\left(\frac{\pi}{7}t\right)$$

Find the wave height, that is, the vertical distance between the trough and the crest of the wave.

2. A didgeridoo player playing a pure tone creates vibrations modeled by the function

$$v(t) = .7 \sin(880\pi t)$$

where $v(t)$ is the displacement of the didgeridoo end in millimeters at time t seconds.

(a) Find the period of the vibration.

(b) Find the frequency of the vibration (that is, the number of times the didgeridoo vibrates per second.

(c) Graph the function v.

3. BLOOD PRESSURE. Each time your heart beats, your blood pressure first increases and then decreases as the heart rests between beats. The maximum and minimum blood pressures are caled *systolic* and *diastolic* pressures, respectively.

$$\text{blood pressure reading} = \frac{\text{systolic}}{\text{diastolic}} a$$

If your blood pressure is modeled by the function

$$p(t) = 115 + 25 \sin 160\pi t$$

where $p(t)$ is the pressure in mmHg, at time t measured in minutes. (80/20 is considered normal)

(a) Find the period of p.

(b) Find the number of heartbeats per minute.

(c) Graph the function p.

(d) Find the blood pressure reading.