Math Analysis Honors
Ch 8 WS 2 Trig Inverse Applications

1. The equation $y = 54.5 + 23.5 \sin(\pi x/6 - 2\pi/3)$ models the average monthly temperatures of Springfield, MO, where x denotes the number of months with January represented by 1. During which two months is the average temperature 54.5° ?

2. The average power P of an electrical circuit with alternation current is determined by the equation $P = VI\cos(x)$, V is the voltage, I is the current, and x is the measure of phase angle. A circuit has a voltage of 122 volts and a current of 0.62 amperes. If a circuit produces an average of 7.3 watts of power, find the measure of the phase angle.

3. Malus'Law describes the amount of light transmitted through two polarizing filters. If the axes of The two filters are at an angle of x radians, the intensity I of the light transmitted through the filters is determined by the equation $I = I_o \cos^2(x)$, where I_o is the intensity of the light that shines on the filters. At what angle should the axes be held so the one-eight of the transmitted light passes through the filters?

4. The strength of a magnetic field is called magnetic induction. An equation for magnetic induction is $B = F(IL \sin x)^{-1}$, where F is a force on a current I which is moving through a wire of length L at an x to the magnetic field. A wire within a magnetic field is 1 m long and carries a current of 5 amps. The force on the wire is 0.2 newton, and the magnetic induction is 0.04 newton per ampere-meter. What is the angle of the wire to the magnetic field?

5. A TV camera on the ground follows the launch of a 120-foot rocket. The camera is x feet from the launch pad and the base of the rocket is y feet above the ground. The angle, A, of the camera lens is given by the equation $\tan A = 120x / (x^2 + y^2 + 120y)$. Find the angle needed for a rocket 200 feet above the ground is the camera is located 400 feet from the launch pad.

6. A nautical mile is equal to an arc length of one minute of a degree. The actual length varies slightly since the Earth is not a perfect sphere. The formula for the length of a nautical mile in feet, L, on the latitude line x is: $L = 6077 - 31\cos(2x)$. a) Solve the formula for x b) find the length of a nautical mile on the 40th latitude c) on what latitude is the length of a nautical mile 6060 feet?

7. A civil engineer is designing a curve for a new highway. She uses the equation: $\tan x = v^2/gr$, where x is the angle the curve should be banked, r is the radius of the circular arc and g is gravity (32 ft/sec^2) and v the velocity of the vehicle. At what angle should a curve with a radius of 1200 feet be banked, to accommodate a speed of 65 mph? (65 mph = 95.33 ft/sec).