# AFM Objective 2.04 (continued)
# Circular Trigonometric Functions

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**Complete the following problems on a separate sheet of notebook paper. Be neat and organized. Must draw diagram and show equation(s) used for full credit. Box in final answer. This will count as a quiz grade and is due on Friday, Mar. 16 at the beginning of class.**

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**Problem 1:** Sketch the graph of $f(x) = a \cdot \cos(bx) + c$ for $0 < x < 2\pi$ where $a = 5$, $b = 2$, and $c = 3$. Use graph paper. Attach to back of notebook paper or cut and paste graph on notebook paper. Be neat.

a. Discuss the intercepts and the maximum and minimum points of the above function.
b. As the value of $a$ approaches zero, explain the change in value of $f\ (x)$.
c. As the value of $b$ increases, explain the change to the corresponding graph.

**Problem 2:** Consider the functions $f(x) = 3 \cdot \sin\left(\frac{1}{2}x\right)$ and it's parent function $g(x) = \sin x$.

a. Which function has the larger amplitude?
b. Write a function that has a smaller amplitude then either $f\ (x)$ or $g\ (x)$.
c. Write a function that has a longer period then either $f\ (x)$ or $g\ (x)$.
d. If $k(x) = 3 \cdot \sin\left(\frac{1}{2}x - \frac{\pi}{2}\right) + 1$, describe the transformation from $f\ (x)$.

**Problem 3:** Suppose the function h(t) = 8.5sin(0.017t – 1.35) + 12 models the hours of sunlight for a town in Alaska, where t = 1 is the first day of the year. Based on the function, what is the approximate range of daylight hours for the town? <u>Justify your answer.</u>

**Problem 4:** Write a function has an amplitude that is twice the size and a period that is three times the size of the function $f(x) = 3\sin\left(\frac{x}{4} - 1\right) + 4$ ?

**Problem 5:** A Ferris wheel is designed in such a way that the height (h), in feet, of the seat above the ground at any time, t, is modeled by the function $h(t) = 70 - 53\sin\left(\frac{\pi}{10}t + \frac{\pi}{2}\right)$ . <u>Justify your answer.</u>