These problems are a supplement to the section 4.4 assignment. It is worth seven extra points and it is due on May 24th along with the homework for section 4.4. This was done because I didn’t feel that the homework assigned from section 4.4 adequately covered what I expected students to know and I wanted to make sure that we were all prepared for the exam.

1. (2pt) The graph of \( y = Q(t) \) is shown below. Find an equation for \( Q(t) \).

Answer to 1: ______________________________

2. (2pt) Find a periodic function \( f \) which satisfies the following:
   - The maximum of \( f \) is 11.
   - The amplitude of \( f \) is 4.
   - The period of \( f \) is 8.
   - \( f(5) = 9 \) and \( f \) is decreasing when \( x = 5 \).

Answer to 2: ______________________________

3. A chemical engineer is designing a reactor and needs to model the temperature inside of the reactor. Let \( C(t) \) be the temperature (in degrees Celsius) \( t \) minutes after the engineer starts the reactor (at which point the reactor is at room temperature). The process in the reactor takes 50 minutes during which the temperature starts at room temperature (20 degrees Celsius), reaches a peak of 80 degrees Celsius, and then returns to room temperature. After that point the reactor restarts the process and continues indefinitely.
   (a) (2pt) Find an equation for \( C(t) \) assuming that \( C \) is a sinusoidal function.

   Answer to 3(a): ______________________________

   (b) (2pt) If the reactor runs for a total of 120 minutes, find all of the times at which the temperature inside of the reactor was 30 degrees Celsius. Round to two decimal places.

   Answer to 3(b): ______________________________

   (c) (1pt) What was the temperature inside of the reactor when it was shut down (after 120 minutes)?

   Answer to 3(c): ______________________________