**Instructions:** Read each problem.  Write a sentence or two about the approach you might take to solve each problem.  Draw a picture to illustrate the scenario.  Write a formula that might be needed to help set up or solve the problem.  **DO NOT SOLVE THE PROBLEMS**.

1.  Antonio and Lucia are both driving through the desert from Tucson to San Diego, which takes each of them 7 hours of driving time. Antonio's car starts out full with 14 gallons of gas and uses 2 gallons per hour. Lucia's SUV starts out full with 30 gallons of gas and uses 6 gallons per hour.   Both drivers leave Tucson at 10:00 a.m.  Each driver has a scheduled 30-minute lunch stop an hour and a half into the trip, at which time they will fill their tanks.  Assume each person stops for gas as needed, just as the tank is empty, and then the tank is filled instantaneously, but each stop takes 15 minutes.

    (A)  Let $A(t)$ represent the number of gallons of gas in Antonio's tank, and $L(t)$ represent the number of gallons of gas in Lucia's tank, where $t$ is the number of hours since 10:00 a.m.  Sketch the graphs of $y = A(t)$ and $y = L(t)$ on the same set of axes.  Label all important points.

    (B)  Does Antonio need to make another gas stop?  Does Lucia?  At what time does each car reach the destination?

    (C)  Write expressions for $y = A(t)$ and $y = L(t)$.  Indicate the domain for each.

    (D)  Marco has the same make and model car as Antonio, and gets the same gas mileage. He is driving the same trip as Antonio and Lucia, but leaves Tucson at 11:30 a.m. with a full tank.  Let $M(t)$ represent the number of gallons of gas in Marco's tank, where $t$ is the number of hours since 10:00 a.m.  Express $M(t)$ as a transformation of $A(t)$.

    (E)  Sophia is taking the same trip in an SUV that has a tank that holds 36 gallons and uses 6 gallons per hour. Let $S(t)$ represent the number of gallons of gas in Sophia's tank, where $t$ is the number of hours since 10:00 a.m.  Is it true that $S(t) = L(t) + 6$?  Explain.

2. An office building has the following heating schedule: At midnight ($t$=0) the building's temperature is $50^0$F. This temperature is maintained until 5 am. Then the temperature of the building begins to increase so that by 8 am the temperature is $70^0$F (constant slope). It will maintain this constant temperature until 5pm. At 5 pm the building's temperature starts to decrease so that by 8 pm the temperature is again $50^0$F (constant slope).

   (A) Graph the temperature, $T$, as a function of time since midnight.

   (B) Someone accidentally leans on the wrong button, and the thermostat's clock is adjusted so that it is two hours fast. The same accident shifts the temperature so that it is held 3 degrees higher than the original setting. Find a formula for the temperature as a function of time for this new heating schedule in terms of, $T$, the original schedule function. Draw the graph.

   (C) Describe in words the heating schedule determined by, $H(t)=T(t-3)-4$, the transformation of the original heating schedule function, $T$.

   (D) What is the temperature in the building at 8 pm with the heating schedule given in part (C).

3. Write the equation of the circle that satisfies the given conditions.
   The line connecting the points (3, 2) and (-1, 6) forms a diameter of the circle.