ENGINEERING 2C3   Assignment #4

1.   [Serway Chapter 19 Question 6, pg 544]
        Explain why a column of mercury in a thermometer first descends slightly and then rises when
        placed in hot water.

2.   [Serway Chapter 19 Problem 18, pg 545]
        A concrete walk is poured on a day when the temperature is 20 °C in such a way that the ends
        are unable to move.
        a.   What is the stress in the cement on a hot day of 50 °C?
        b.   Does the concrete fracture? Take Young's modulus for concrete to be 7.0 x 10^6 N/m^2
                and the tensile strength to be 2 x 10^6 N/m^2.

3.   [Serway Chapter 19 Problem 20, pg 545]
        The New River Gorge Bridge in West Virginia is a steel arch bridge 518 m in length. How
        much does its length change between temperature extremes of -20.0 °C and 35.0 °C?

4.   [Serway Chapter 19 Problem 22, pg 546]
        A steel rod undergoes a stretching force of 500 N. Its cross sectional area is 2.00 cm^2. Find
        the change in temperature that would elongate the rod by the same amount produced by the
        500-N force. *(Hint: Refer to Tables 12.1 and 19.2.)*

5.   [Serway Chapter 19 Problem 42, pg 547]
        At 25.0 m below the surface of the sea (density = 1025 kg/m^3), where the temperature is 5.00
        °C, a diver exhales an air bubble having a volume of 1.00 cm^3. If the surface temperature of
        the sea is 20.0 °C, what is the volume of the bubble right before it breaks the surface?

6.   [Serway Chapter 19 Problem 45, pg 547]
        The tire on a bicycle is filled with air to a gauge pressure of 550 kPa at 20 °C. What is the
        gauge pressure in the tire after a ride on a hot day when the tire air temperature is 40 °C?
        (Assume constant volume and a constant atmospheric pressure of 101 kPa.)