**Homework 1 Solutions PHYS 212 Dr. Amir**

**Chapter 17:**

**3.** (I) (*a*) “Room temperature” is often taken to be 68°F. What is this on the Celsius scale? (*b*) The temperature of the filament in a lightbulb is about 1900°C. What is this on the Fahrenheit scale?

(*a*) 

(*b*) 

**13.** (II) To make a secure fit, rivets that are larger than the rivet hole are often used and the rivet is cooled (usually in dry ice) before it is placed in the hole. A steel rivet 1.872 cm in diameter is to be placed in a hole 1.870 cm in diameter in a metal at 20°C. To what temperature must the rivet be cooled if it is to fit in the hole?

The rivet must be cooled so that its diameter becomes the same as the diameter of the hole.



The temperature of “dry ice” is about  so this process will be successful.

**18.** (II) (*a*) A brass plug is to be placed in a ring made of iron. At 15°C, the diameter of the plug is 8.753 cm and that of the inside of the ring is 8.743 cm. They must both be brought to what common temperature in order to fit? (*b*) What if the plug were iron and the ring brass?

(*a*) The sum of the original diameter plus the expansion must be the same for both the plug and the

ring.



(*b*) Simply switch the initial values in the above calculation.



**Chapter 19**

**2.** (II) When a diver jumps into the ocean, water leaks into the gap region between the diver’s skin and her wetsuit, forming a water layer about 0.5 mm thick. Assuming the total surface area of the wetsuit covering the diver is about  and that ocean water enters the suit at 10°C and is warmed by the diver to skin temperature of 35°C, estimate how much energy (in units of candy ) is required by this heating process.

Find the mass of warmed water from the volume of water and its density of . Then use the fact that 1 kcal of energy raises 1 kg of water by , and that the water warms by .



**11.** (II) How long does it take a 750-W coffeepot to bring to a boil 0.75 L of water initially at 8.0°C? Assume that the part of the pot which is heated with the water is made of 280 g of aluminum, and that no water boils away.

The heat must warm both the water and the pot to 100oC. The heat is also the power times the time.



**24.** (II) The specific heat of mercury is 138J/Kg ºC Determine the latent heat of fusion of mercury using the following calorimeter data: 1.00 kg of solid Hg at its melting point of

-39°C is placed in a 0.620-kg aluminum calorimeter with 0.400 kg of water at 12.80°C; the resulting equilibrium temperature is 5.06°C.

The heat lost by the aluminum and the water must equal the heat needed to melt the mercury and to warm the mercury to the equilibrium temperature.

