

4/1/2006

FABE 481	Instructor:Dr. Kaletunç TAs : Boon Lee Tee
<u>Homework #2</u>	Spring 2006

1. Text book. 2.4 a, b, c, d
2. The Prandtl Number is a dimensionless group important in heat transfer calculations. It is defined as $c_p\mu/k$, where c_p is the heat capacity of a fluid, μ is the fluid viscosity, and k is the thermal conductivity. For a particular fluid, $c_p=0.783$ J/g \cdot $^{\circ}$ C, $k=0.386$ W/(m \cdot $^{\circ}$ C), and $\mu=2536$ lb_m/(ft \cdot h). Calculate the Prandtl number.
3. During the preparation of a jam filling, a 25% fruit concentrate is to be agitated in a vessel of 1.2 m diameter by a propeller of 0.4 m diameter. The density of concentrate is 79.9 lb_m/ft³. The rotational speed of propeller is 600 rpm. How much power is required to rotate the mixer? The power can be calculated by the following equation
 $P = (N_p) \rho N^3 D^5$ where P is power (kW), N is rotational speed, and D is the diameter of the propeller. N_p is the power number and is equal to 3.5.
5. Convert
 - a. 3 wk to milliseconds
 - b. 26 miles/h to ft/s
 - c. 57.5 lb_m/ft³ to kg/m³