ChE 306 HEAT TRANSFER
FALL 2010
Exam 2 Review Sheet

Ch 6 Convection: Introduction
Ch 7 External Forced Convection
Ch 8 Internal Forced Convection

Concepts:

- Velocity (or Hydrodynamic) Boundary Layer
- Thermal Boundary Layer
- Newton's Law of Cooling
- Local vs. Average Convection Coefficients
  - effect of geometry on coefficients
- Laminar vs. Turbulent Flow (esp for flat plates and cylinders)
- Dimensionless Parameters: most important: Nusselt # and Prandtl #
- Correlations for Nu-
  - depend on many factors:
    - External vs. Internal Flow
    - Geometry (flat plate, cylinder, sphere, tube bank, etc.)
    - Reynolds Number
    - Pr (liquid metals)
    - Laminar/Turbulent/Mixed Flow Correlations (External Flow)
    - Inside/Outside of Fully Developed (thermal) Flow ($x_{FD,t}$) (Internal Flow)
      - (Entry Length)

- Choice of Different Temperatures for Measuring Fluid Properties
  - Film Temperature
  - Surface Temperature
  - Bulk Fluid Temperature
  - Mean Fluid Temperature (for internal flow or tube banks)

- Choice of driving forces for heat transfer equation (Newton's law of cooling)
  - Ts - Tinf
  - Ts-Tmean
  - LMTD

- Iterative Problems (when do these happen?)

- Connection between Heat Transfer and Pressure Drop (tube banks and internal flow)

- What options do you have to improve convective heat transfer in a process?

- Internal Energy (U) Change for Fluids (tube banks and internal flow)

- Bookmark Tables at the end of Chapter 7 & 8!

Recall Earlier Concepts: Thermal Resistances! Fourier's Law!