

Homework 11

DUE Friday, 11 April, 8:50 am
Read Ch. 11 (all sections), *BSL*

1. Review of Exam 2. This exercise aims to help you learn from errors or problems that may have arisen during exam 2. It applies to every problem for which you did not receive full credit.
 - (a) If you lost points due to a mathematical error, explain what the error was and suggest a strategy to help you avoid similar errors in the future.
 - (b) If you lost full credit for other reasons, then solve the full problem here. If you are unable to get a start on the solution, study the solution key. Then, without referring to the solution key, re-read the problem and solve it on your own. **DO NOT** simply copy the solution from the key or you defeat the purpose of this exercise.

All reworked exam solutions (parts a and b) should accompany your Homework 11. After completing this exercise you should be able to re-take Exam 2 and achieve a perfect score.

2. Forced convection heat transfer. Consider Eq. 10.8-12, which describes the temperature of a fluid as a function of r and z as it moves through a circular tube.
 - (a) Substitute expressions for dimensionless temperature (θ) and dimensionless radius (ξ), given in equations 10.8-16 and 10.8-17, respectively. This results in an expression for $\theta = \theta(\xi, z)$.
 - (b) Now show how one may define a dimensionless axial coordinate ζ ('zeta') = (Cz) such that the resulting partial differential equation is fully dimensionless. Solve for C .
3. Solve Problem 10B.7 Forced-convection heat transfer in flow between parallel plates.
4. Solve Problem 10B.9 (part a). Plug flow with forced-convection heat transfer.
5. Solve Problem 10B.10 For part (c) obtain the velocity profile $v_z(\xi)$ in terms of A and B , but do not evaluate A .