

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
Department of Mechanical Engineering

2.61 INTERNAL COMBUSTION ENGINES

Homework Set #2

Problems (the problem numbers refer to the ones in the text book):

- 3.1 Also calculate the power output, assume fuel conversion efficiency is 0.3.
- 3.3 Exercise in exhaust gas analysis.
- 3.13 This problem gives you some feel for what comes out in the exhaust pipe. The reason for doing the “dry” versus “wet” analysis is because water vapor is usually removed from the exhaust gas before the CO and CO<sub>2</sub> measurements (to prevent condensation on the instruments).

Hint: Do the stoichiometric balance with  $\phi$  moles of fuel under lean and rich condition separately. For the former, there is no CO or H<sub>2</sub>; for the latter, assume that in the exhaust, there are a moles of H<sub>2</sub> and 3a moles of CO. You can relate a to  $\phi$  by elemental balance.

Use Matlab or a spread sheet to calculate the numbers.

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