

**HW#3 Internal Combustion Engines**

1) The equation for Break Power of an internal combustion engine is given by:

$$P_b = \eta_{\text{mech}} \eta_t \eta_v \eta_c \rho_a V_d Q_{\text{lhv}} (1/\text{AFR})(N/n)$$

A Fuel additive (used in a 0.1% concentration) is claimed to give a 20% increase in power. Based on the above explain how this is (or is not) possible.

2) Which factors are likely to be affected?

3) What is the maximum reasonable increase in power you could expect from a 0.1% concentration fuel additive?

Based on the Break Power equation in question #1, answer the following:

4) What engine design parameters can we change to increase the break power? What is their rational upper limit?

5) What operational parameters can we change to increase the break power? What is their rational upper limit?