

**HW#7 Internal Combustion Engines**

1) Given a gasoline cost of 2RM/liter, a CNG cost of 0.60RM/kg, and an NGV conversion cost of 4,800RM. A 4-cylinder car gets 12.5 km/l of gasoline, and BSFC *increases* by 20% when using CNG. The car is used an average of 20,000km/year. If a CNG conversion costs 3,500RM, how long would you have to drive the NGV to recuperate the conversion cost?

2A) The car in question 1 has a gasoline EFI system, and operates at 3000 rpm (on average) at an average vehicle speed of 100kph. If the injector's gasoline flow rate (open) is 5g/sec, what is the typical injection duration [ms]? Assume one injection per cylinder per cycle.

2B) When the engine operates on CNG what is the minimum injector flow rate [cc/sec of gas] to insure no more than a 25% duty cycle (on the injector) if the engine produces 60kW at 6000 rpm with a BSFC of 400 gm/kWh?