1. Consider a small country (Thailand) with the following demand and supply curves for oil:

Supply = 4\(P_o^s - 50\); \quad \text{Demand} = 1000 - 2P_o^c

(the supply curve implies output is zero if price is 50 or lower). Note that \(P_o^s\) is the price producers (sellers) receive for oil output, \(P_o^c\) is the price consumers pay for oil, and if there are no \textit{domestic} taxes or subsidies, then: \(P_o^c = P_o^s\). Assume Thailand can import oil at a \textbf{given} \textit{world} price of: \(P_s = 80\) per barrel of oil. Further, assume that Thailand imposes an import tariff of \(t\) per barrel of oil imported.

a) Show how: domestic price, consumption and production change as \(t\) increases. Also, calculate how consumer surplus, producer surplus, and government tariff revenue change as \(t\) increases. What happens to overall welfare in Thailand as \(t\) increases?

(i) If \(t \geq 120\), what happens to the level of trade?

b) Compare the domestic equilibrium when \(t = 70\) to the case where there is no tariff, but there is an import quota of 300 units. How do imports, domestic price, production and consumption compare under the two plans? Under a quota what happens to the government tariff revenue that occurs under a tariff? Which policy is better for the country?

c) Suppose, instead of an import tariff, the Thai government subsidizes imports at a rate of \(s\) (<30) per unit of import. Thus, for each unit of oil imported, the net cost to the importer is \(\{80-s\}\); 80 is the cost from buying on the world market, and \(s\) is the amount received from the government. Show how this import subsidy affects: (i) domestic price; (ii) consumer surplus; (iii) producer surplus; (iv) government expenditures on the subsidy; and (iv) overall welfare.

i. Is there any import quota that would have the same effect as the import subsidy?

ii. If the import tariff lowers welfare, does that imply the import subsidy raises welfare? Explain.

d) Suppose the goal of the Thai government is to reduce domestic oil consumption to 700 units. Show how this goal can be reached with an import tariff (as above).

i. Find what tax on oil consumption (regardless of whether produced domestically or imported) would reduce domestic consumption to 700. Show how the impact of the consumption tax differs from that of the import tariff.

ii. Compare the sum of consumer surplus, producer surplus and government tariff revenue (or the revenue from the consumption tax) under the two plans. Which plan yields higher welfare, given the production goal?
iii. If the goal were to increase domestic production of oil, what do you think would be the best policy? (just a discussion is required).

2. Use the same model as in question 1, with \( \text{Supply} = 4\left( P_o^r - 50 \right) \); \( \text{Demand} = 1000 - 2P_o^r \).

However, suppose that the **production** of oil creates pollution, which damages the environment. Suppose the estimated (economic) cost of this pollution is 45 per barrel of oil produced. This means that the **marginal social cost** of producing oil exceeds the marginal private cost of producing oil by 45. Also recall that the supply curve comes from equating marginal private cost to price so the marginal private cost (MPC) of producing oil is: \( Q^* = 4\left( P_o^r - 50 \right) \rightarrow MPC = 50 + \left( \frac{Q^*}{4} \right) \).

Finally, assume the government has no domestic policy to redress the externality (pollution).

a) Suppose the world price of oil is **80**. Is it possible that allowing oil imports could lower domestic welfare? How does the presence of the externality affect the gains from trade?

i. Calculate the gains (or losses) from trade in this setting.

ii. If the government were to use some policy to attack the market failure (the pollution), what policy should it use? Be as specific as possible.

iii. If only trade policy is possible, should the government tax or subsidize oil imports?

b) Suppose now that the world price of oil is **220** so that, with no government policy, the country will export oil. Is it possible that free trade could lower domestic welfare in this case? Why does this case differ from part (a)?

i. Calculate the gains (or losses) from trade in this setting.

ii. If the government were to use some policy to attack the market failure (the pollution), what policy should it use? Be as specific as possible.

iii. If only trade policy is possible, should the government tax or subsidize oil exports?