Cap-and-Trade Problem

Suppose that firm A and B both produce 80 units of pollution. The federal government wants to reduce pollution levels. The marginal costs associated with pollution reduction are

$$MC_A = 50 + 3Q_A$$

for firm A and

$$MC_B = 20 + 6Q_B$$

for firm B, where Q_A and Q_B are the quantities of pollution *reduced* by each firm. Society's marginal benefit from pollution reduction is given by

$$MB = 590 - 3Q_T$$

where Q_T is the total reduction in pollution.

- What is the socially optimal level of each firm's pollution reduction?
- How much total pollution is there in the social optimum?
- Explain why it is inefficient to give each firm an *equal* number of pollution permits (if they are not allowed to trade them).
- Explain how the social optimum can be achieved if firms are given equal numbers of pollution permits but *are* allowed to trade them.
- Can the social optimum be achieved using a tax on pollution?