1. **Incidence of Commodity Taxation: Heating Oil**

Consider the heating oil market in New England. Demand is

$$Q^D = 300 - 40P,$$

and supply is

$$Q^S = 20P,$$

where P is dollars per gallon and Q is thousands of gallons.

(a) Compute the market equilibrium (price and quantity).

Solution: Set $Q^D = Q^S$:

$$300 - 40P = 20P \;\Rightarrow\; 300 = 60P \;\Rightarrow\; P^* = 5, \quad Q^* = 100. \tag{1}$$

(b) Now suppose a per–gallon tax of $t = \$3$ is imposed on heating oil. Compute the new equilibrium price paid by consumers P^C, the price received by producers P^S, and the traded quantity.

Solution:
Add the tax to the supply side: $P^S = P^C - t$.

$$300 - 40P^C = 20(P^C - 3). \tag{2}$$

$$300 - 40P^C = 20P^C - 60 \;\Rightarrow\; 360 = 60P^C \;\Rightarrow\; P^C = 6. \tag{3}$$

$$Q^\tau = 60, \qquad P^S = P^C - 3 = 3. \tag{4}$$

So quantity falls to 60 (thousand gallons), consumers pay \$6, and producers receive \$3.

(c) Explain the incidence of the tax and the intuition.

Solution: Of the \$3 tax, consumers bear \$1 (their price rises from \$5 to \$6) and producers bear \$2 (their net price falls from \$5 to \$3). Hence one-third of the burden is on consumers and two-thirds on producers. The side of the market that is less elastic bears more of the burden. At the pre-tax equilibrium, the (absolute) demand elasticity is $|-40| \cdot (5/100) = 2$, while the supply elasticity is $20 \cdot (5/100) = 1$. Because supply is more inelastic than demand, producers bear the larger share of the tax.