# Try It Yourself: Negative Externalities

Suppose that leather is sold in a perfectly competitive industry. The industry short-run supply curve (marginal cost curve) is $P = MC = 3Q$, where $Q$ is measured in millions of hides per year. The demand for leather hides is given by $Q = 60/7 - P/7$.

1. Find the equilibrium market price and quantity.
2. Suppose that the leather tanning releases bad stuff into waterways. The external marginal cost is \$4/hide. Calculate the socially optimal level of output and price for the tanning industry.

# Problem 1

1. Equilibrium price and quantity. Find equilibrium $P$ and $Q$ by setting $Q_S = Q_D$ (or $P_S = P_D$). To set the curves equal, we need to start by finding inverse demand. If $Q = 60/7 - P/7$, then $P = 60 - 7Q$. Set $3Q = 60 - 7Q$, or $10Q = 60$, which implies $Q^*_{market} = 6$. Price is $P^*_{market} = 3Q^* = 18$. (Check that $P = 60 - 7(6) = 60 - 42 = 18$.)

2. With external costs

   The true cost should be $MC = 3Q + 4$. Solve again. Note before solving that $P^*_{SC} > P^*_{market}$, and $Q^*_{market} > Q^*_{SC}$.
   Set $3Q + 4 = 60 - 7Q$, or $10Q = 56$, which implies that $Q^*_{SC} = 5.6$.
   To find price, $P^*_{SC} = 3Q^* + 4 = 3(5.6) + 4 = 16.8 + 4 = 20.8$.
   Check that $P^*_{SC} = 60 - 7(5.6) = 60 - 39.2 = 20.8$.