

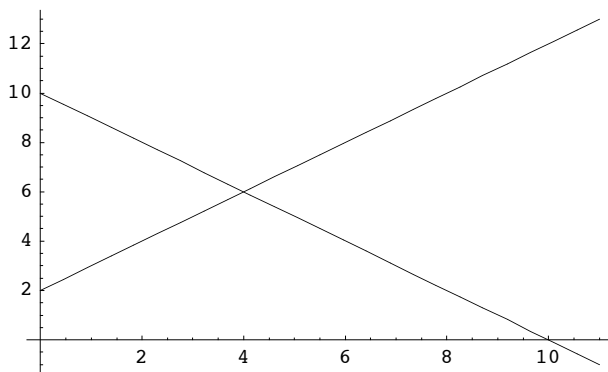
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In[1]:= (*Returning to our example from Week 4,
a simple market with no externalities. The free
market equilibrium occurs where supply=demand.*)
dem = 10 - Q
sup = Q + 2
fm = Solve[dem == sup, Q][[1]]
pfm = dem /. fm
Plot[{dem, sup}, {Q, 0, 11}, {AxesOrigin -> {0, 0}}]
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Out[1]= $10 - Q$

Out[2]= $2 + Q$

Out[3]= $\{Q \rightarrow 4\}$

Out[4]= 6



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In[11]:= (*Recall that if there are no externalities,
the free-market equilibrium is socially optimal, in that the net benefits
(marginal benefit-marginal cost) from production of the good are
maximized. It also turns out that consumer and producer surplus are maximized,
but we will not focus on this aspect in a quantitative way. But do
note that the marginal benefits are represented by the demand curve,
and the marginal costs by the supply curve, as before. Notice several things on the
graphs: marginal net benefits are zero at the point where supply equals demand;
total net benefits are maximized at this point;
BUT total net benefits remain positive for some distance after this;
AND the quantity where total net benefits are zero is far beyond where
marginal benefit = marginal cost. So, using cost-benefit analysis,
we often decide to implement projects at higher levels than may be socially optimal,
due to our inability to directly assess marginal benefits and costs.*)
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mnb = dem - sup
tnb = Integrate[mnb, Q]
Solve [tnb == 0, Q]
Plot[mnb, {Q, 0, 11}, {AxesOrigin -> {0, 0}}]
Plot[tnb, {Q, 0, 11}, {AxesOrigin -> {0, 0}}]
```

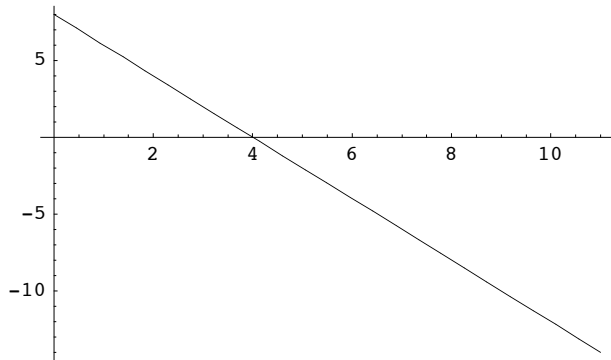
Out[11]= $8 - 2Q$

marginal net benefit = $8 - 2Q$

Out[12]= $8Q - Q^2$

total net benefit = $8Q - Q^2$ (zero at 8)

`Out[13]= {{Q → 0}, {Q → 8}}`



Notice also that when marginal benefits become negative, total benefits are declining.

