In recent editions of the textbook, the example changed to the avocado market.

Demand:

For this example, we have:$Q = (p, p_t, Y)$

Where:

- Q is the quantity demanded of avocados in millions of pounds per month.
- p is the price per pound of avocados
- P_t is the price per pound of tomatoes
- Y is the income of consumers.

To take it from the general abstract form to a specific functional form:

$$Q = 104 - 40 * p + 20 * p_t + 0.01 * Y$$

This is not some general result that we should know where the numbers came from, but from a regression result of data that is related to this particular case.

What does that tell us?

- As the price per pound of avocados goes up, the quantity demanded of avocados goes down.
- As the price per pound of tomatoes goes up, the quantity demanded of avocados goes up (substitute good).
- As the income of consumers goes up, the demand for avocados goes up (normal good).

This has too many moving parts to allow us to focus just on the relationship between Q and p, which is the underlying demand curve we are after here.

So to clean up some of the other 'moving parts' (income, price of tomato) we can plug in the average value of these from the data set. You don't know these, they are coming from the data set and being given to us as average price of tomatoes in the data set = $0.80 and average income in the data set = $4,000. So take the specific functional form from above and fill in the blanks:

$$Q = 104 - 40 * p + 20 * \$0.80 + 0.01 * \$4{,}000$$

And this can be reduced to Q=104+16+40-40*p=160-40*p.

Plug in some values for a demand curve:

Price per unit of avocado	Quantity demanded
$0.50	140.0
$1.00	120.0
$1.50	100.0
$2.00	80.0
$2.50	60.0
$3.00	40.0

Slope? Change in rise (price) over change in run (quantity side) = $\frac{+\$0.50}{-20}$=-0.025.

Supply?

$Q=S(p,p_f)$

Where:

- Q is the quantity supplied of avocados in millions of pounds per month.
- p is the price per pound of avocados
- p_f is the price of fertilizer.

To take it from the general abstract form to the specific functional form:

$$Q = 58 + 15 * p - 20 * p_f$$

Where again, this is coming from the data and using regression methods that are not the topic of this class so we just take these as given results.

What does this tell us?

- As the price per pound of avocados goes up, the quantity supplied goes up.
- As the price per unit of fertilizer goes up (an input to supply), the quantity supplied goes up.

Note, as an aside, in both the demand and supply specifications, there are all other kinds of things that might go in.

Demand: the price of nachos, consumer information about the nutritional benefits of eating avocados, rainfall or fires in Mexico and California…

Supply: the price of gas for transport of avocados, the regulatory environment for avocados, consumer concern that the romaine lettuce food contamination incident might make avocados unsafe…

By omitting things like this you are making the assumption that:

a) they might logically matter, but they did not vary over the time period in question so are not a variable (and implicitly are sucked up into the 104 or the 58 constant), or;

b) they don't matter even if they vary enough to keep in the equation.

These are assumptions and choices.

Again, to simplify, we can use the average price of fertilizer of $0.40 per unit to get:

$$Q = 58 + 15 * p - 20 * \$0.40$$

So that Q=58+15*p-8 or Q=50+15*p

Plug in some values for a demand curve:

Price per unit of avocado	Quantity supplied
$0.50	57.5
$1.00	65.0
$1.50	72.5
$2.00	80.0
$2.50	87.5
$3.00	95.0

Slope? Change in rise (price) over change in run (quantity side) = $\frac{+\$0.50}{+7.5}$=+0.067

Equilibrium.

If demand is defined by Quantity demanded = 160-40*p

And supply is defined by Quantity supplied = 50+15*p

The equilibrium / market clearing price – where this means the quantity supplied equals the quantity demanded is found by:

160-40*p=50+15*p.

Subtract 50 from each side.

110-40*p=15*p.

Add 40*p to each side.

110=55*p

Multiply each side by (1/55)

(110/55)= (55/55)*p

2=p.

If p = 2, the quantity demanded is 160-40*2=160-80=80.

If p=2, the quantity supplied is 50+15*p=15*15*2=15*30=80.

NOTE

We often use the inverse demand curve that looks at p as a function of Q (above we have Q as a function of p).

Invert Q=160-40*p.

Add +40*p to each side.

Q+40*p=160

Subtract Q from each side.

40*p=160-Q

Get p by itself by multiplying each side by (1/40)

P=(160/40)-(1/40)*p, p=4-0.025*Q (look back at the demand slope calculated above)

Invert Q=50+15*p

Subtract 50 from each side.

Q-50=15*p

Multiply each side by (1/15)

(1/15)*Q-(50/15)=p, or -3.33+0.067*Q=p

For fun establish that the market clearing Q equates 4-0.025Q=-3.33+0.067*Q

7.33=0.09167*Q gives 79.96, subject to rounding Q=80.