

13. Suppose the demand for down pillows is given by $Q^D = 100 - P$, and that the supply of down pillows is given by $Q^S = -20 + 2P$.
- Solve for the equilibrium price.
 - Plug the equilibrium price back into the demand equation and solve for the equilibrium quantity.
 - Double-check your work by plugging the equilibrium price back into the supply equation and solving for the equilibrium quantity. Does your answer agree with what you got in (b)?
 - Solve for the elasticities of demand and supply at the equilibrium point. Which is more elastic, demand or supply?
 - Invert the demand and supply functions (in other words, solve each for P) and graph them. Do the equilibrium point and relative elasticities shown in the graph appear to coincide with your answers?
 - Show that the laws of demand and of supply hold using calculus.
 - Redo part (d) using calculus and confirm that your answer is the same as what you determined algebraically in that part.
 - Suppose that the extended supply curve for down pillows can be expressed as $Q^S = -15 + 2P - 0.5P_f$, where P_f is the price of feathers. Using calculus, determine whether the quantity supplied of down pillows increases or decreases as the price of feathers increases.
 - Suppose that the price of enough feathers to stuff one pillow is \$10. Show that this supply curve is consistent with the supply relationship given in the setup to the problem.
 - If the price of feathers decreases to \$8, what is the equation for the new supply curve? In which direction has the supply curve shifted?