Problem Set 2, due Tuesday, September 30th, 2014

Shifts in supply and demand

13. Suppose that the market for wine behaves like a typical, perfectly competitive, 'textbook' supply and demand model, with smoothly increasing marginal cost and decreasing marginal benefit. Fill in each of the blanks below with "up" or "down".

a) If the supply curve shifts to the right, equilibrium price of wine will go _____, and equilibrium quantity will go _____.

b) If grapes (an input in wine production) become more expensive, we would expect the equilibrium price of wine to go _____ and the equilibrium quantity of wine to go _____.

c) Suppose that wine and beer are substitutes. If the price of beer decreases, we would expect the equilibrium price of wine to go _____ and the equilibrium quantity of wine to go _____.

14. Same problem, but with peanut butter instead of wine.

a) If a new invention reduces the cost of producing peanuts, we would expect the equilibrium price of peanut butter to go _____ and the equilibrium quantity of peanut butter to go _____.

b) Suppose that peanut butter and jelly are complements. If the price of jelly decreases, we would expect the equilibrium price of peanut butter to go _____ and the equilibrium quantity of peanut butter to go _____.

Summing demand curves

15. Suppose that, in the market for green slime, there are 100 consumers, each with the same marginal benefit function, $MB_i = 10 - 2q$.

a) Each individual consumer has the demand function $q_{d_i} =$ _____ $-$ _____p.

b) Market demand is given by the function $Q_d =$ _____ $-$ _____p.

c) Combining all the consumers, market-wide marginal benefit can be represented by the function $MB =$ _____ $-$ _____q.

16. Suppose that, in the market for green slime, there are 20 consumers, each with the same marginal benefit function, $MB_i = 6 - \frac{1}{10}q$.

a) Each individual consumer has the demand function $q_{d_i} =$ _____ $-$ _____p.

b) Market demand is given by the function $Q_d =$ _____ $-$ _____p.

c) Combining all the consumers, market-wide marginal benefit can be represented by the function $MB =$ _____ $-$ _____q.

Elasticity

17. Suppose that the market demand for floo powder is given by the function $Q_d = 1000 - 50p$. Find ε_d, the price elasticity of demand for floo powder, at a price of $p = 5$.

18. In what way is the price elasticity of demand a more useful measure of the sensitivity of demand to price than the (inverse) slope of the demand curve, i.e. $\Delta Q_d / \Delta p$?

19. Suppose that the market demand for cotton candy is given by the marginal benefit function $MB = 10 - \frac{1}{4}q$. Find ε_d, the price elasticity of demand for cotton candy, at a price of $p = 5$.

Excise tax

20. Demand and supply in the market for spicy sauce (which is perfectly competitive, etc.) are determined by the marginal benefit function $MB = 70 - q$ and the marginal cost function $MC = 10 + \frac{1}{2}q$, where q is the quantity of spicy sauce.

For parts (a) and (b), suppose that there is no tax.

a) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

b) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, and total economic surplus is $TES =$_____.

For parts (c) through (e), suppose that there is a tax of $15 per unit.

c) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

d) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, government revenue is $GR =$_____, total economic surplus is $TES =$_____, and deadweight loss is $DWL =$_____.

e) On the blank graph, draw the demand curve, supply curve, and the supply curve with the tax. Use different colors or patterns to shade in consumer surplus, producer surplus, government revenue, and deadweight loss.

f) With the imposition of this tax, why is more lost in consumer and producer surplus than what is gained in government revenue?

21. Demand and supply in the market for fresh pasta (which is perfectly competitive, etc.) are determined by the marginal benefit function $MB = 120 - 2q$ and the marginal cost function $MC = 2q$, where q is the quantity of spicy sauce.

For parts (a) and (b), suppose that there is no tax.

a) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

b) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, and total economic surplus is $TES =$_____.

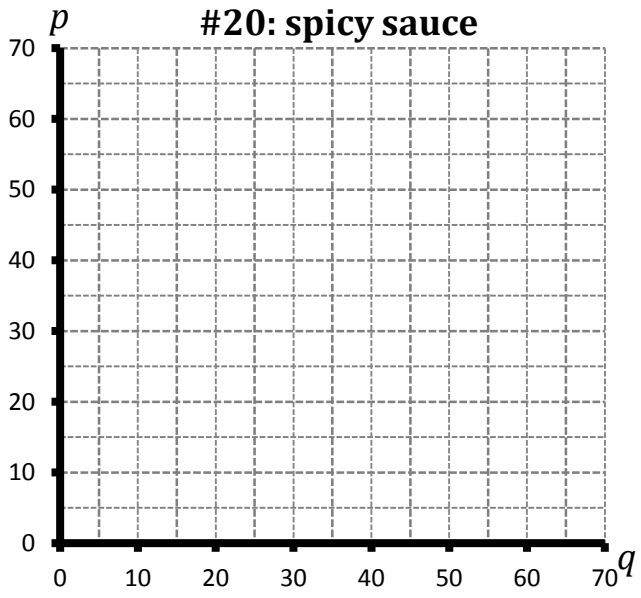
For parts (c) through (e), suppose that there is a tax of $40 per unit.

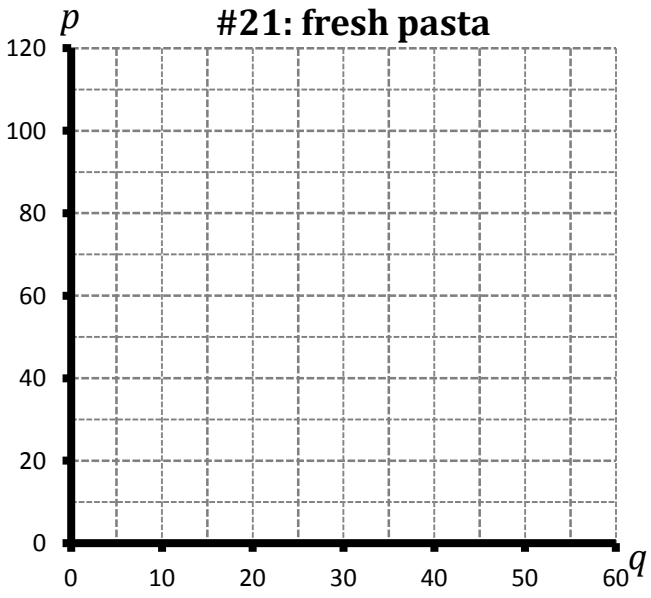
c) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

d) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, government revenue is $GR =$_____, total economic surplus is $TES =$_____, and deadweight loss is $DWL =$_____.

e) On the blank graph, draw the demand curve, supply curve, and the supply curve with the tax. Use different colors or patterns to shade in consumer surplus, producer surplus, government revenue, and deadweight loss.

Excise tax graphs





Price controls

22. Demand and supply in the market for mystical soda (which is perfectly competitive, etc.) are determined by the marginal benefit function $MB = 60 - 3q$ and the marginal cost function $MC = 20 + q$, where q is the quantity of mystical soda.

For parts (a) and (b), suppose that there is no price control.

a) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

b) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, and total economic surplus is $TES =$_____.

For parts (c) through (e), suppose that there is a price floor of $36 per unit.

c) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

d) Find the excess supply or demand: Excess _____ of _____.

e) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, total economic surplus is $TES =$_____, and deadweight loss is $DWL =$_____.

f) On the blank graph, draw the demand curve, supply curve, and the price floor. Use different colors or patterns to shade in consumer surplus, producer surplus, and deadweight loss.

g) If the price floor is removed, *why* do we expect the market equilibrium price to return to its value in part (a)? Or, in other words, why is this an equilibrium in the first place? Try to explain as clearly as possibly why alternative prices cause market pressures that push in the direction of this value.

h) Further, explain why the market equilibrium in (a) is Pareto efficient, such that no one can be made better off without someone else being made worse off.

23. Demand and supply in the market for laser candy (which is perfectly competitive, etc.) are determined by the marginal benefit function $MB = 20 - \frac{1}{2}q$ and the marginal cost function $MC = 5 + \frac{1}{4}q$, where q is the quantity of laser candy.

For parts (a) and (b), suppose that there is no price control.

a) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

b) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, and total economic surplus is $TES =$_____.

For parts (c) through (e), suppose that there is a price ceiling of $8 per unit.

c) In the market equilibrium, the price is $p^* =$_____, and the quantity is $q^* =$_____.

d) Find the excess supply or demand: Excess _____ of _____.

e) Consumer surplus is $CS =$_____, producer surplus is $PS =$_____, total economic surplus is $TES =$_____, and deadweight loss is $DWL =$_____.

f) On the blank graph, draw the demand curve, supply curve, and the price ceiling. Use different colors or patterns to shade in consumer surplus, producer surplus, and deadweight loss.

Price control graphs