Microeconomics II
Brief Solutions Final Exam
August 17, 2017

1. (a) If we normalize so there is one consumer of each type, total demand is D(p)=(20 – p)+(16 – p)=36 – 2p. Profit p(36-2p) is maximized at **p=9**. The poor buys 16-9=7 bars at p=9 with a DWL of (16-7)9/2=81/2. The rich buys 20-9=11 bars at p=9 with a DWL of (20-11)9/2=81/2. So **the DWL in this market is (81/2)+(81/2)=81**. (b) The rich gets the efficient consumption level, as if p=MC=0. So **the rich consumes 20 bars**. The poor consumes an amount x such that his marginal willingness to pay, 16-x, is half of the rich's, 20-x. So, **the poor consumes x=12 bars.**
2. a) Setting demand = supply, 12-p=2p, solving for p and substituting back into either demand or supply we get **output x=8**. (b) The demand curve is p = 12−x. If the marginal externality benefit is 3, the social marginal benefit (SMB) is 12+3−x. The supply curve is p = x/2 which is the marginal cost curve. Set MC equal to SMB to get the **efficient output x=10**. (c) Since the marginal benefit from the externality is 3, **the government should set the Pigouvian subsidy s = 3**. If firms get this subsidy, the supply curve becomes x=2(p+3) and setting this equal to demand, we find 2(p+3)=12-p so p=2 and output is x=2(2+3)=10 which is efficient. (Alternatively, the consumers could get the subsidy s=3, we get the same efficient outcome x=10).
3. Firm A's profit is $(p-25)q_A=(75-q_A-q_B)q_A$ and firm B's profit is $(p-10)q_B=(90-y-q_A-q_B)q_B$. Thus, firm A's best response is $q_A = (75-q_B)/2$and firm B's is $q_B=(90-q_A)/2$. (a) In Cournot equilibrium, each firm chooses a best response to the other's quantity. Thus $q_A = (75-q_B)/2$ and $q_B=(90-q_A)/2$ which means $q_A=20$ and $q_B=35$. **The price is 100-20-35=45**. (b) Taking B's response $q_B=(90-q_A)/2$ into account, A maximizes $(75-q_A-(90-q_A)/2)q_A=(30-(0.5)q_A)q_A$ so it sets $q_A=30$. Firm B responds by $q_B=(90-30)/2=30$. **The price is 100-30-30=40**.
4. (a) **Albert has two pure strategies: Renovate or Don't**. **Betsy has four pure strategies: OO,OE,EO,EE**. For example, OE denotes the strategy "Out if he Renovates, Enter if he doesn't", EE denotes ``Enter whatever Albert does'', etc. (b) The payoff matrix reveals **two Nash equilibria: (Renovate,OE) and (Don't,EE)**. (c) **Only (Renovate,OE) is subgame perfect**: if he renovates then Betsy maximizes her payoff by staying out, and if he doesn't renovate then she maximizes her payoff by entering, so she must play OE.

	OO	OE	EO	EE
Renovate	100,0	100,0	-10,-25	-10,-25
Don't	200,0	45,45	200,0	45,45

5. a) The total willingness to pay for the public good is 1/(2G) +6/(4G)=8/(4G) which should equal the marginal cost, 1 (the Samuelson condition) Thus, **the efficient level of public good is G=2**. (b) At the optimum G=2, A's willingness to pay is 1/4 and B's is 3/4. Thus, **the personalized prices should be 1/4 for consumer A and 3/4 for consumer B**.
6. a) The payoff matrix reveals **a unique Nash equilibrium: both choose Low Price**. **Low is in fact the dominant strategy for both**, because it is the best response whatever the opponent does. (b) We use the "grim" trigger strategy. If both play High forever, each gets 100 forever which is worth $100/(1-\delta)$. If one firm deviates to Low today, it gets 150 today and but is "punished" by getting 50 in all future periods, which is worth $150+\delta 50/(1-\delta)$. Thus, it will deviate if $100/(1-\delta)<150+\delta 50/(1-\delta)$. Therefore, **the smallest δ is one half (δ=1/2)**.

	High	Low
High	100,100	0 ,150
Low	150,0	50,50