

Problem set 3:

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Question 1:

33.3%	33.3%	33.3%
<b>Marko</b>	<b>Otto</b>	<b>Pauli</b>
pizza	taco	burger
taco	burger	pizza
burger	pizza	taco

- a) taco vs burger → taco wins (Marko and Otto)  
 taco vs pizza → pizza wins (Marko and Pauli) → pizza wins overall
- b) taco vs pizza → pizza wins (Marko and Pauli)  
 pizza vs burger → burger wins (Otto and Pauli) → burger wins overall
- c) pizza vs burger → burger wins (Pauli and Otto)  
 taco vs burger → taco wins (Marko and Pauli) → taco wins overall
- d) Pauli prefers burger to pizza and taco. Moreover, he knows the preferences of Otto and Marco. Consequently, he prefers the order of the pairwise majority voting to be:  
 First taco and pizza and then the winner vs burger, because with this order the burger will be chosen as the meal.

Question 2:

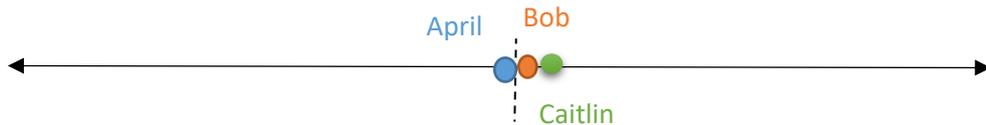
- a) In this case, the middle point is not a Nash Equilibrium anymore. It will be more profitable for one seller to go left and for the other one to go right.  
 We can consider it as a society where citizens do not tend to vote for the people whose opinions are very different from them (we have to define this amount of being different). In this case, being in the middle would not be helpful. Each candidate should pick a side.
- b) Assuming that all the people will buy ice cream wherever they are located, sellers do not have any incentives to move.  
 We can consider it as a bipolar society, which only contains radical left or radical right citizens.
- c) In this case, middle point is not a Nash equilibrium anymore. At first, Bob will move to just right of April, because he will cover all the people on the right hand side and he will lose fewer people on the left hand side, but April is not satisfied now so she will do the

same. They continue changing their places until they get to the new equilibrium point at the right hand side of the old one. At this point, the numbers of the people on both sides are equal to each other.

3.

a)

She will not stand between the sellers and she will be exactly after one of the sellers on the right or left.



b)

In this case, Bob is not happy at all about his position (he gets zero), so he will change his place to the just right of the Caitlin or just left of the April.

c)

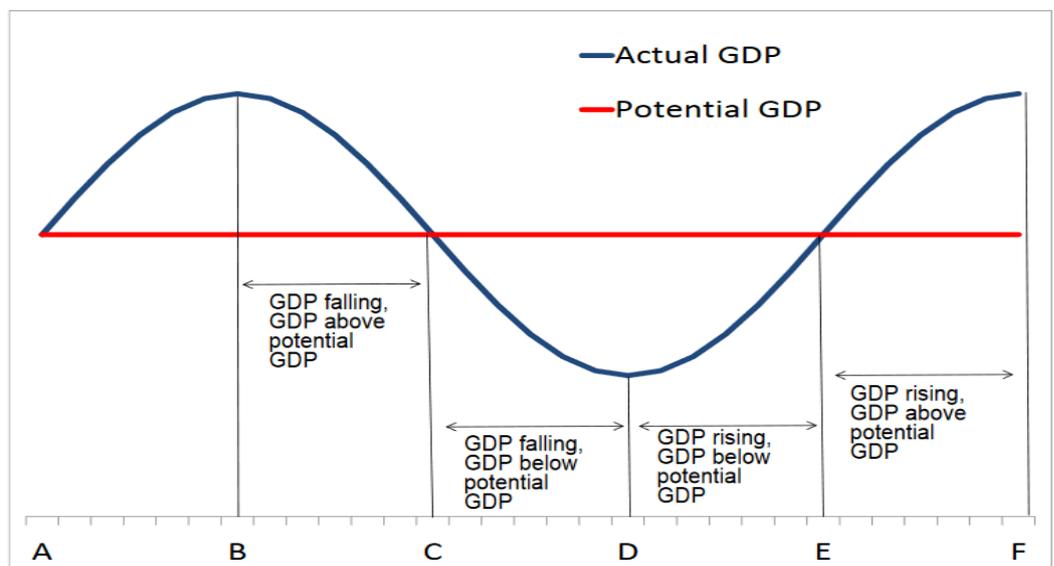
In either case, one of April or Caitlin is not going to be happy about her place so she will do the same. In other words, None of the players wants to be at the middle of other two players, because she will get nothing.

d) According to part 3, there is no Nash equilibrium in this case because none of the players has any incentives to be at the middle of the other two players.

4.

a)

**Figure 5. Stylised Business Cycle with Zero Potential Growth**



Source: Citi Research

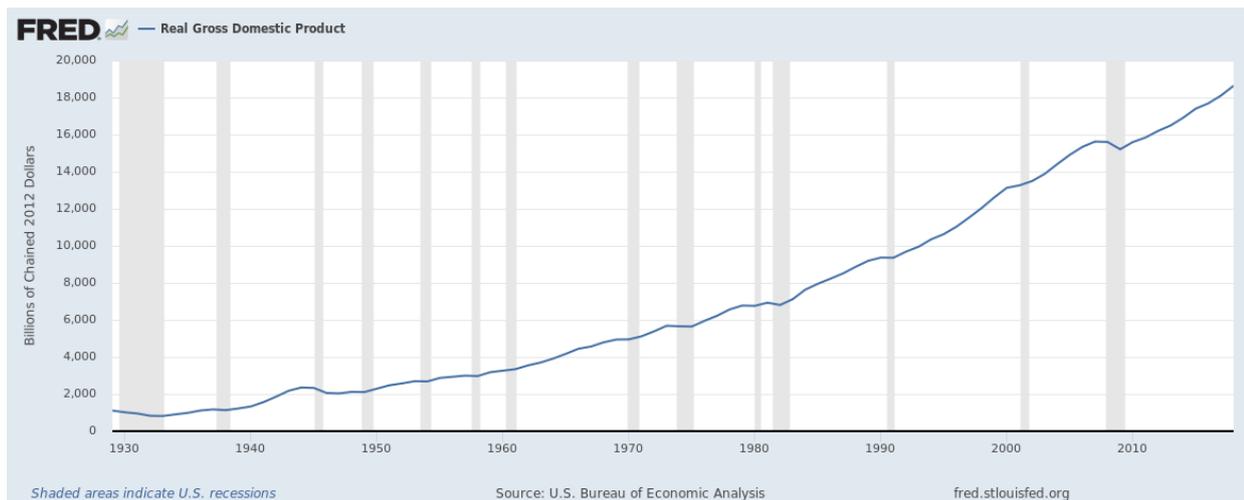
According to Figure 5 in the mentioned paper, we are currently in the period between point B and point C.

Considering first definition (negative growth), this is recession but according to the second definition, this is not a recession because actual GDP (though the growth is negative) is not below the potential growth.

b)

Yes. In a recession, the policymakers may adopt measures to stimulate economic growth (e.g. lowering tax rates, subsidies, government investments, lowering the policy rate), which would be inappropriate (e.g. potentially destabilizing) if the economy were not in a recession.

5.

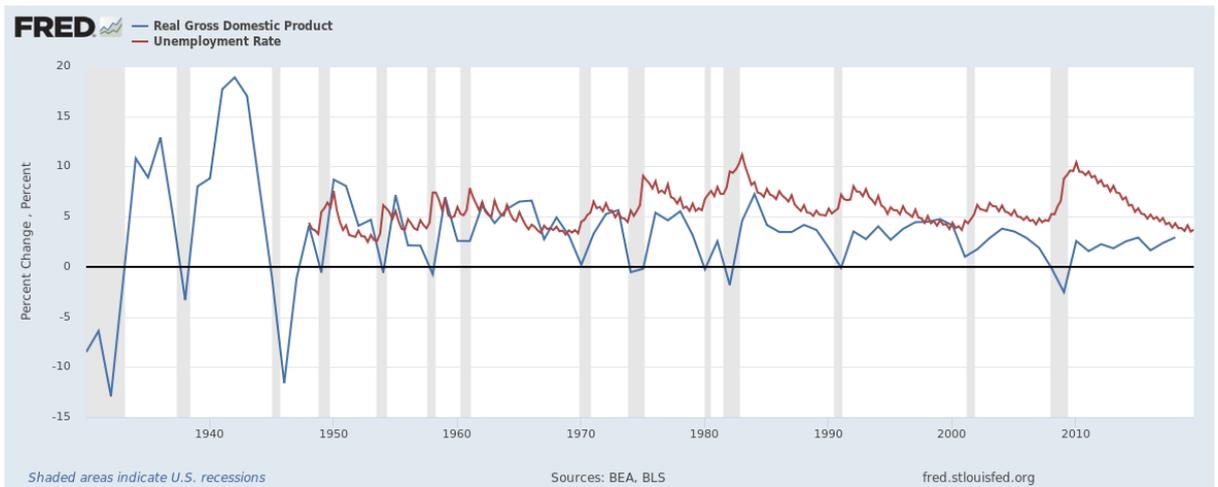


a) Real US GDP in 2018 is 18,638.164 Billion dollars

b) 14 recessions in years: 1929, 1937, 1945, 1949, 1954, 1958, 1961, 1970, 1974, 1980, 1982, 1991, 2001, 2008.

c) The biggest one is 1929 recession, which lasted for 3-4 years.

The next biggest one could be the 2008 recession, which lasted around 2 years.



d) The unemployment increased during the last two recessions (2001, 2008)

e)

Recessions	2001 recession		2008 recession	
Quarters	Quarter 2, 2001	Quarter 4, 2001	Quarter 1, 2008	Quarter 3, 2009
Unemployment rate	4.3	5.2	5.3	9.6

f) According to this graph, whenever we have a recession the unemployment rate increases, and this not just specified to the last two recessions but to all of them from 1929.