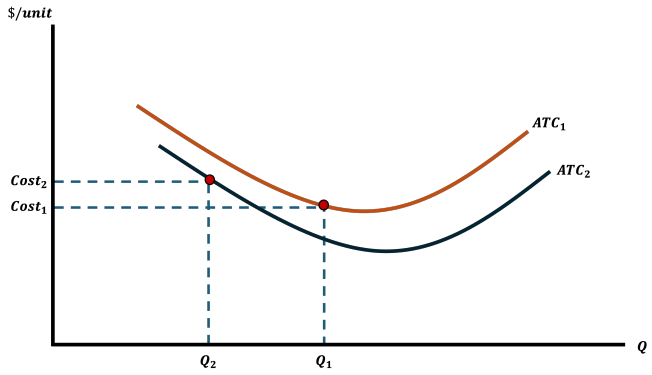
EC 390 Problem Set 02

Instructions: Answers must be submitted online through the designated Canvas assignment in a **PDF file**. Any other file type is not allowed. This Problem Set is due on **October 22 at 11:59am**. Please write as legible and clearly as possible. You will not be given full credit if your answers cannot be easily understood.

Questions

1. [10 points] Take the following Average Total Cost Curves below. Firm 1 is an **incumbent firm** and is represented by the orange ATC curve. Firm 2 is an **entering firm** and is represented by the blue ATC curve. They both produce at their shown quantities Q_1 and Q_2 respectively. The y-axis is the per unit cost and the x-axis represents quantity of goods produced. Explain how this graph demonstrates the **firm incumbency advantage** discussed in the multiple equilibria lecture. Explain (Be brief in your explanation).

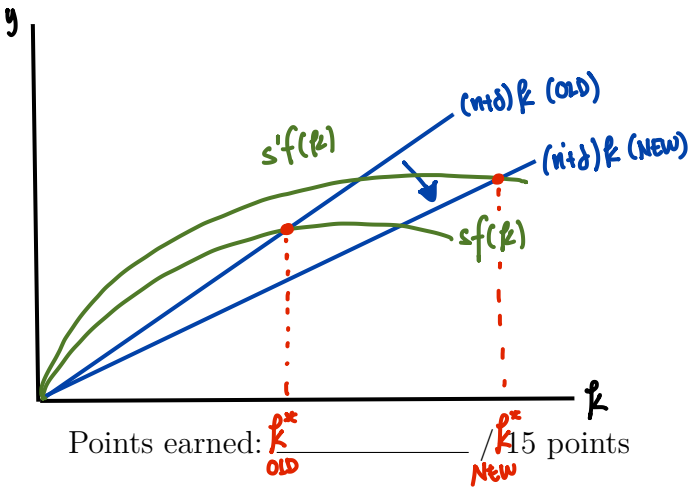


The greater output by Firm 1 comes from their greater market share, so they produce at relatively low avg. costs.

The smaller output by the newer Firm 2, even if they are more efficient, means they face higher avg. costs.

Firm 2 cannot simply obtain more market share.
⇒ Incumbency advantage

2. [5 points] Consider the Solow model discussed in class. In this country, **women's labor force participation** increases which, in turn, reduces fertility rates in the country. At the same time, since there are fewer dependents, households **can save more**. Show graphically what happens to **capital per worker** (k) and **output per worker** (y).



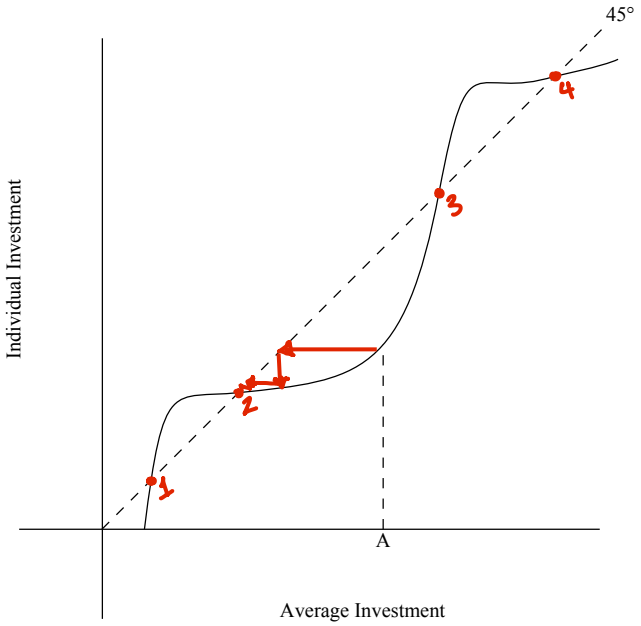
For this problem, I only care that you show the appropriate shifts in the curves.

And that everything be labeled properly.

Points earned: _____ /15 points

3. [2 points] When one agent's actions provide an **incentive** for other agents to take similar actions, we say that there are _____ between these actions

4. Consider the following S-curve diagram:



(a) [2 points] Label the equilibrium points on the graph (Make sure they are identifiable and named)

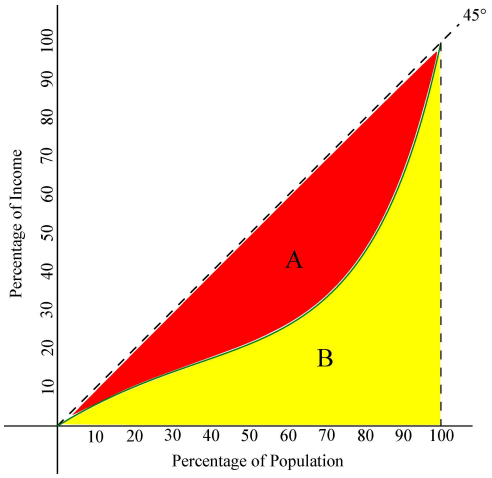
(b) [3 points] Classify each equlibrium as **stable or unstable**

1: Unstable 2: Stable 3: Unstable 4: Stable

(c) [5 points] Suppose that average investment is currently at point A. Where will average investment end up? **Show the dynamics on the graph by drawing arrows**

Moves in step-wise dynamics.

5. Consider the following Lorenz Curve

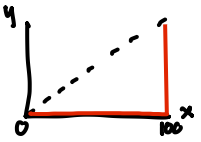


(a) [2 points] Describe how the **Lorenz Curve** would change if the society had **perfect income equality**

The Lorenz Curve would be equal to the 45° line

(b) [2 points] Describe how the **Lorenz Curve** would change if the society had **perfect income inequality**

It would be a right angle w/ the vertex where $x = 100$



(c) [4 points] If the we have the area of $A = 0.15$ and the area of $B = 0.35$, what is the **Gini Coefficient** for this society? **Show your work**

$$GINI = \frac{A}{A+B} = \frac{0.15}{0.15+0.35} = 0.3$$

6. Consider the O-Ring model. It predicts that there will be a strong tendency for the most productive workers to work together. Let there be 6 workers and 2 firms, where each firm hires 3 workers total. There are 3 high-skill q_H workers and 3 low-skill q_L workers, such that $q_H > q_L > 0$. Workers can be assigned in either **sorted groups** or **mixed groups**:

   - **Mixed Assignment:** Firm 1 hires (q_H, q_H, q_L) and Firm 2 hires (q_H, q_L, q_L)
   - **Sorted Assignment:** Firm 1 hires (q_H, q_H, q_H) and Firm 2 hires (q_L, q_L, q_L)

   (a) [5 points] Compute the total output under each **type of assignment**

Mixed Output

$q_H^2 q_L + q_L^2 q_H$

Firm 1 Firm 2

Sorted

$q_H^3 + q_L^3$

Firm 1 Firm 2

   (b) [10 points] Show **algebraically** that the sorted assignment yields stricly higher total output whenever $q_H > q_L$

Want to show Sorted > Mixed, there are 2 possible ways

1. $y_{sorted} - y_{mix} > 0$

$q_H^3 + q_L^3 - (q_H^2 q_L + q_L^2 q_H) > 0$

$q_H^3 + q_L^3 - q_H^2 q_L - q_L^2 q_H > 0$

$q_H^3 - q_H^2 q_L + q_L^3 - q_L^2 q_H > 0$

$q_H^2(q_H - q_L) + q_L^2(q_L - q_H) > 0$

$q_H^2(q_H - q_L) - q_L^2(q_H - q_L) > 0$

$(q_H - q_L)(q_H^2 - q_L^2) > 0$

>0 >0

2. $q_H^3 + q_L^3 > q_H^2 q_L + q_L^2 q_H$

$(q_H + q_L)(q_H^2 - q_H q_L + q_L^2) > q_H q_L (q_H + q_L)$

$q_H^2 - q_H q_L + q_L^2 > q_H q_L$

$q_H^2 - q_H q_L + q_L^2 - q_H q_L > 0$

$q_H^2 - 2 q_H q_L + q_L^2 > 0$

$(q_H - q_L)^2 > 0$

Always >0 if $q_H > q_L$