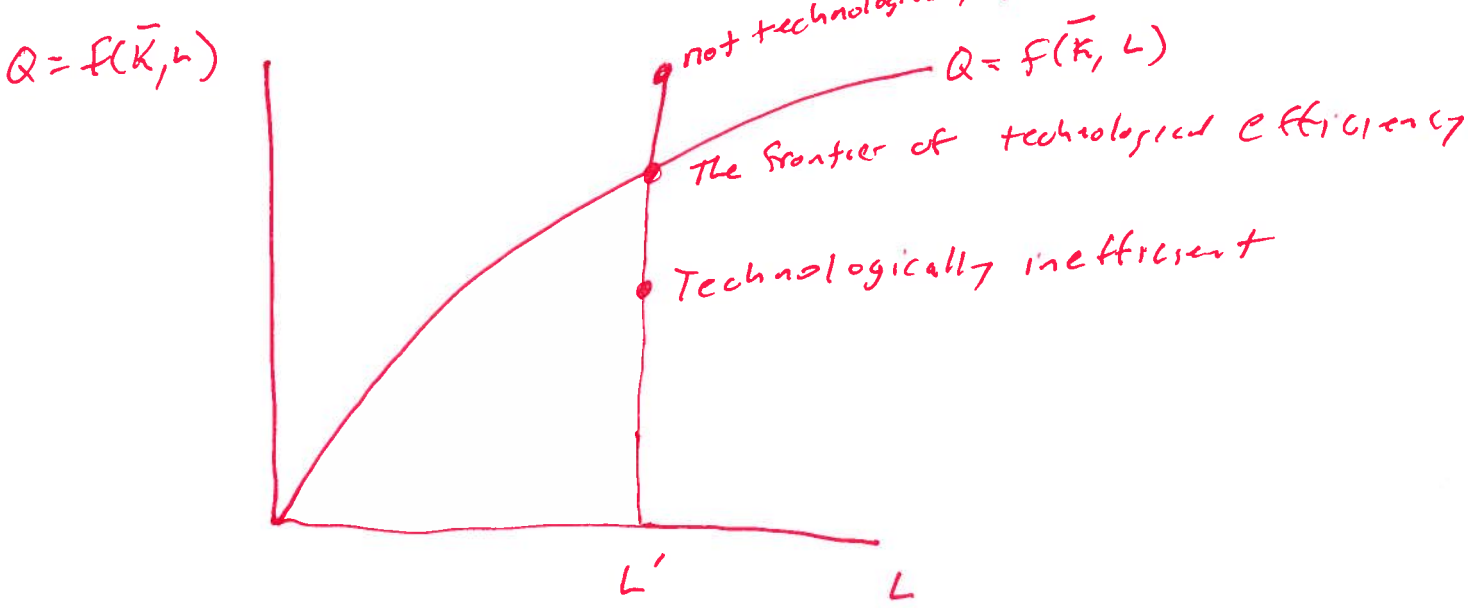
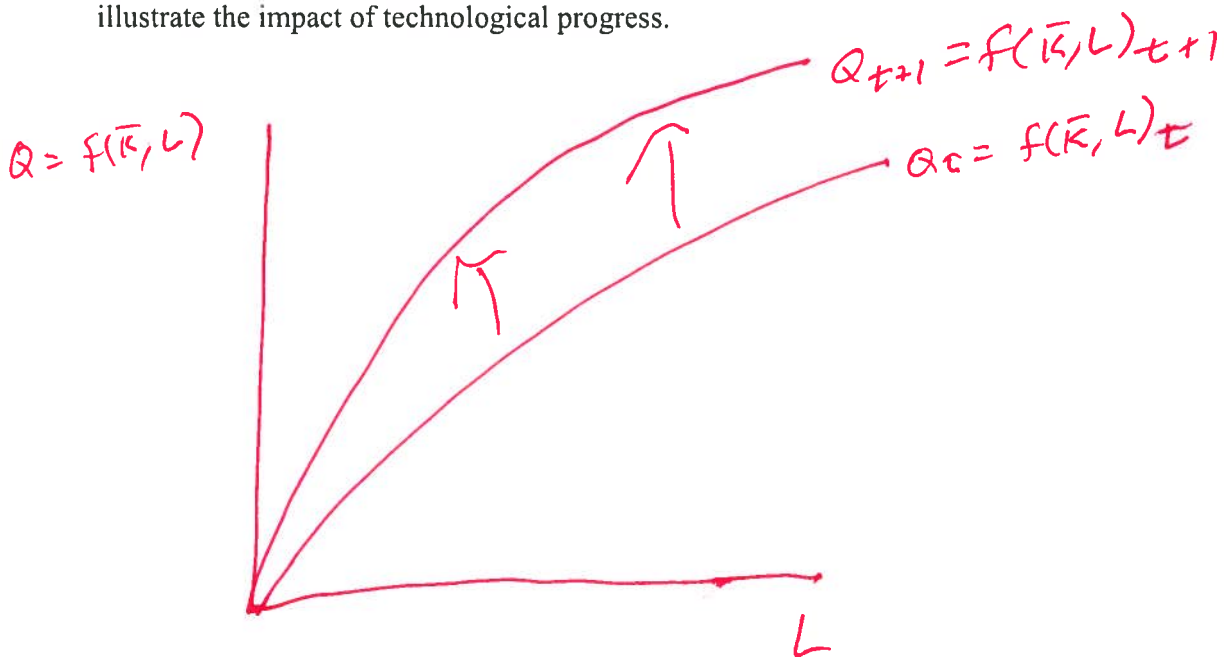
Problem Set #5 Name: KEY
PAI 723
Professor John McPeak
Due_____

1) Production functions

a) Draw a production function and for a given input level illustrate the areas of your graph that correspond to an output level that is: not technologically feasible, the frontier of technological efficiency, and technologically inefficient.



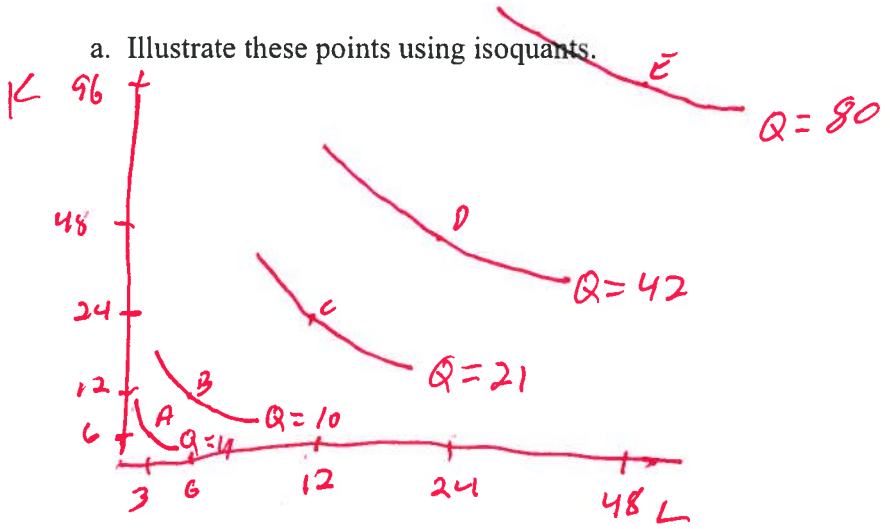
b) Draw a production function. Illustrate on this production function how you could illustrate the impact of technological progress.



2) You are given the following information on the relationship between inputs and production level at various points.

Points	Labor	Capital	Output
A	3	6	4
B	6	12	10
C	12	24	21
D	24	48	42
E	48	96	80

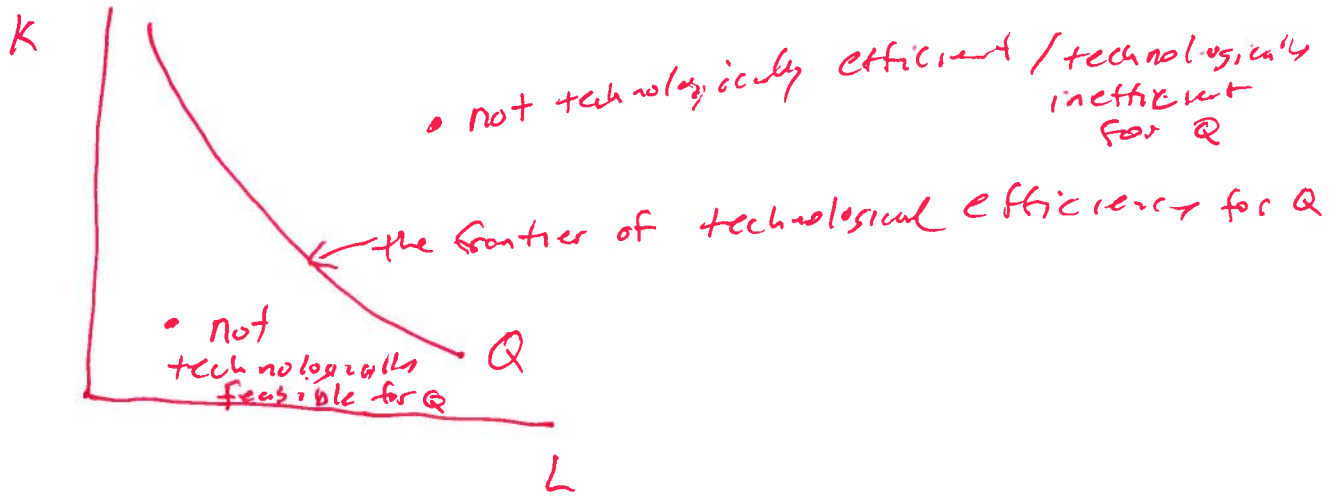
a. Illustrate these points using isoquants.



b. Contrast the returns to scale implied by movement between the points. (circle the correct answer)

From A to B I have (increasing, constant, decreasing) returns to scale.
From B to C I have (increasing, constant, decreasing) returns to scale.
From C to D I have (increasing, constant, decreasing) returns to scale.
From D to E I have (increasing, constant, decreasing) returns to scale.

c) Draw an isoquant and for a given input bundle illustrate the areas of your graph that correspond to an output level that is: not technologically feasible, the frontier of technological efficiency, and technologically inefficient.



3) Production.

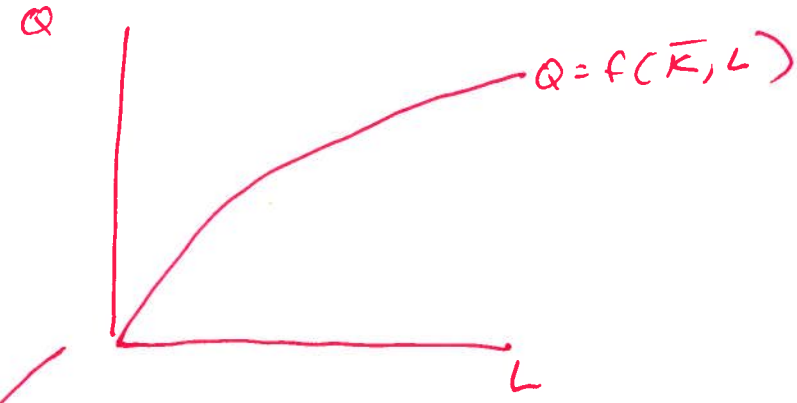
a. Define the marginal product of labor.

$MP_L = \frac{\Delta Q}{\Delta L}$

b. Define the average product of labor.

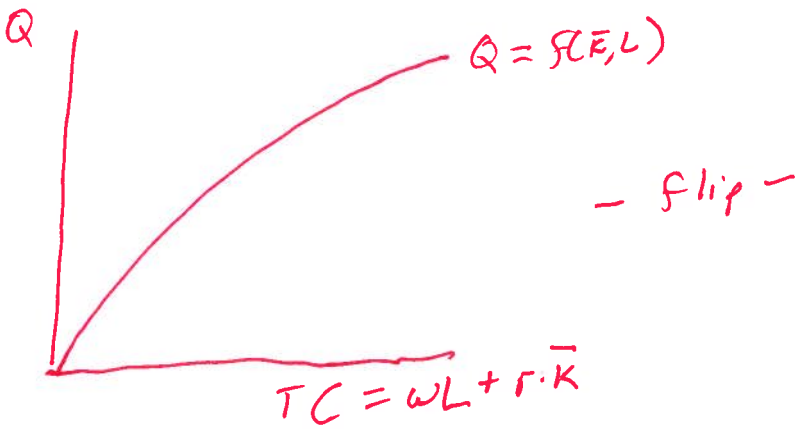
$AP_L = \frac{Q}{L}$

c. Draw a production function with labor as the variable input, and that exhibits diminishing marginal returns to labor.

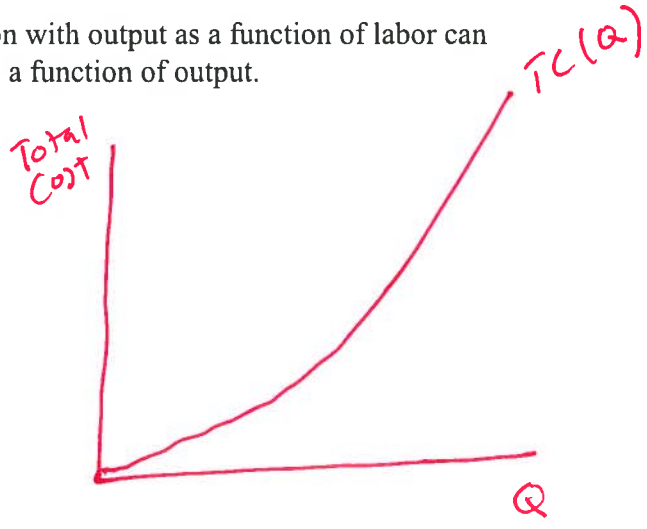


relabel x-axis

d. Illustrate how this production function with output as a function of labor can be turned into a graph of total cost as a function of output.



– flip –



4) Circle the correct description of the logical condition

Condition A	Condition B	What type of condition is B for establishing A?
The point is on the budget line.	The point is the optimal bundle.	N, NS **S, NN** N,S
The point is the optimal bundle.	The point is on the budget line.	**N, NS** S, NN N,S
Felix hates baths	Felix is a cat	N, NS **S, NN** N,S
The last dollar rule is satisfied at a bundle	MRS=MRT at a bundle	N, NS S, NN **N,S**
MP is above AP at q	AP is upward sloping at q	N, NS S, NN **N,S**
A student is enrolled in this class	A student is enrolled at SU / ESF	**N, NS** S, NN N,S
One can get from here to NYC	Greyhound has a bus service daily to NYC	N, NS **S, NN** N,S
A firm is producing in a technologically efficient manner	A firm is producing on the production function	N, NS S, NN **N,S**

N,NS : Necessary, not sufficient [If A, then B]
S, NN: Sufficient, not necessary [A if B / If B, then A]
S,N: Necessary and sufficient. [A if and only if B]