ECO 610
Problem Set #2 KEY
Fall 2020

1. "Cocoa prices for September delivery on the ICE Futures U.S. exchange settled at $3,260 a metric ton on Friday, up 12% in 2015." (*WSJ* 6/20/15). World output of cocoa has declined from 4.36 million metric tons to 4.23 million metric tons between 2014 and 2015.

(a) (6 pts.) Calculate own-price elasticity of demand for cocoa.

$$\varepsilon_{x,P_x} = -\frac{\%\,\Delta Q}{\%\,\Delta P}$$

$$= \frac{\frac{4.36 - 4.23}{\frac{1}{2}(4.36 + 4.23)}}{12\%}$$

$$= \frac{3\%}{12\%} = 0.25$$

Demand is inelastic.

(b) (4 pts.) Knowing what you do about factors affecting own-price elasticity of demand, can you think of any reasons why you got a number like you did?

Cocoa is a necessary input in the production of chocolate candy — no substitutes are readily available! To the extent that consumers are addicted to chocolate, demand for a necessary input like cocoa will be inelastic.

2. We own and operate a Johnny Jim's sandwich shop. After some experimentation with our current configuration of the restaurant, we find that labor and output vary in the following way:

Labor (person-hours)	0	1	2	3	4	5	6	7	8
Output (meals per hour)	0	12	32	64	90	105	115	120	122

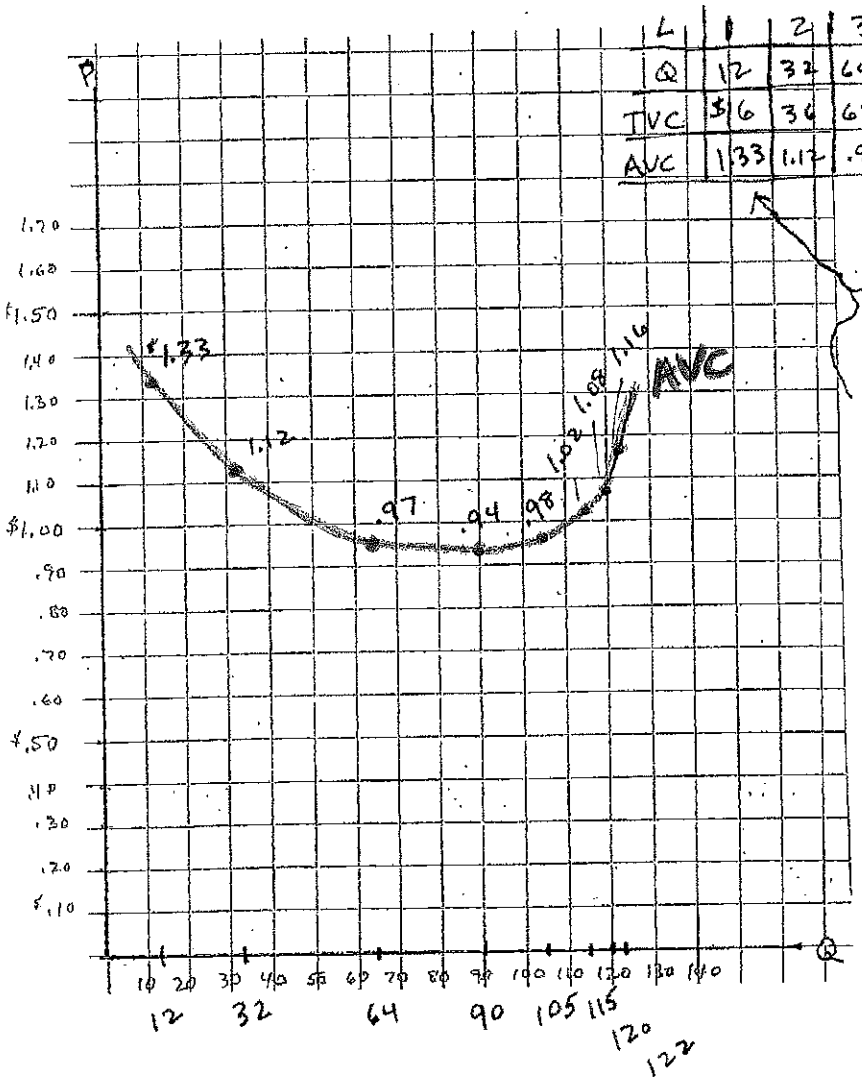
(a) (5 pts.) Use the concept of marginal product to explain at what point diminishing returns set in.

$MP_L = \frac{\Delta Q}{\Delta L}$ = 12 20 32 26 15 10 5 2

Diminishing marginal returns set in with the addition of a fourth worker

(b) (5 pts.) Total compensation costs (wages plus benefits) per worker are $10 per hour. The only other variable costs besides labor are the sandwich ingredients, which cost a constant $.50 per sandwich. Plot eight points on our firm's average variable cost curve.

L	1	2	3	4	5	6	7	8
Q	12	32	64	90	105	115	120	122
TVC	$16	36	62	85	102.5	117.5	130	141
AVC	1.33	1.17	.97	.94	.98	1.02	1.08	1.16



TVC = L * $10 + $.50 * Q

if L = 1, Q = 12, and

TVC = 1 * $10 + .5 * 12 = $16

AVC = $\frac{TVC}{Q} = \frac{16}{12} = \$1.33$

when Q = 12