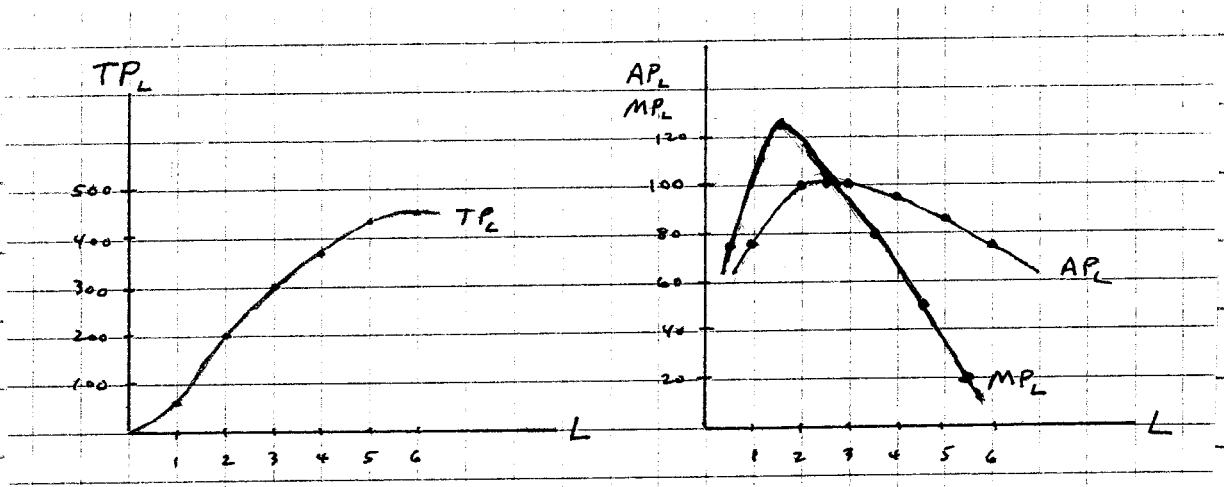
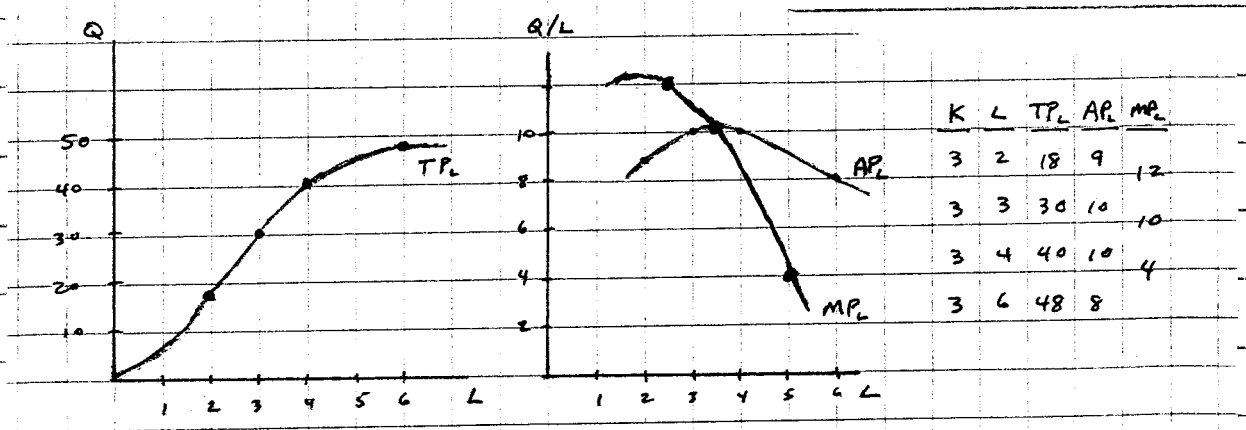
ECO 401-002 Problem Set #4 KEY Fall 2004

1. 7.1

Amt. of Trucks	Amt. of Labor	Total Output	Avg Prod of Labor	Marginal Product of Labor
2	0	0	--	--
2	1	75	75	75
2	2	200	100	125
2	3	300	100	100
2	4	380	95	80
2	5	430	86	50
2	6	450	75	20



2.



K	L	TP_L	AP_L	MP_L
3	2	18	9	12
3	3	30	10	10
3	4	40	10	4
3	6	48	8	

3. $Q = 286\ H^{.37}$

(a) $MP_H = \frac{dQ}{dH} = (.37)(286)\ H^{.37-1} = 105.82\ H^{-.63}$

(b) $\frac{d\,MP_H}{dH} = -66.7\ H^{-1.63} < 0$, so the marginal return to additional horsepower is diminishing.

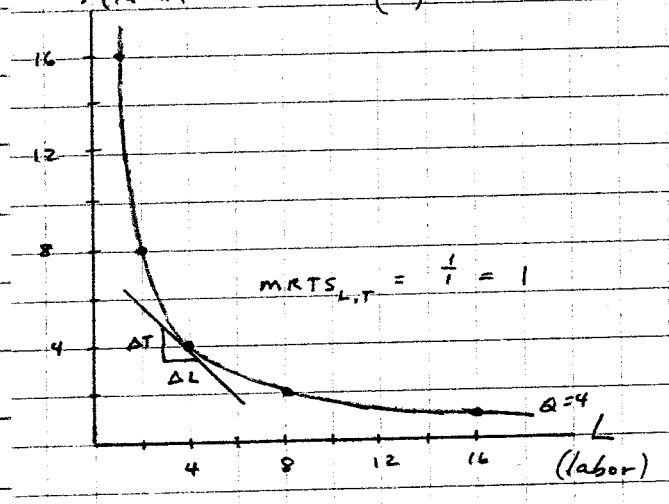
alternatively,

H	Q	MP_H
9	644.8	> 25.6
10	670.4	> 24.1
11	694.5	

$\Rightarrow MP_H$ is diminishing.

(c) $\Longrightarrow$

4. (a)



$Q = L^{1/2} T^{1/2}$

L	T	Q
16	1	4
1	16	4
8	2	4
2	8	4
4	4	4

(b) $MRTS_{L,T} = \frac{\Delta T}{\Delta L}$ = slope of isoquant at $L = 4, T = 4$

alternatively, $MRTS_{L,T} = \frac{MP_L}{MP_T}$

$Q = L^{1/2} T^{1/2}$

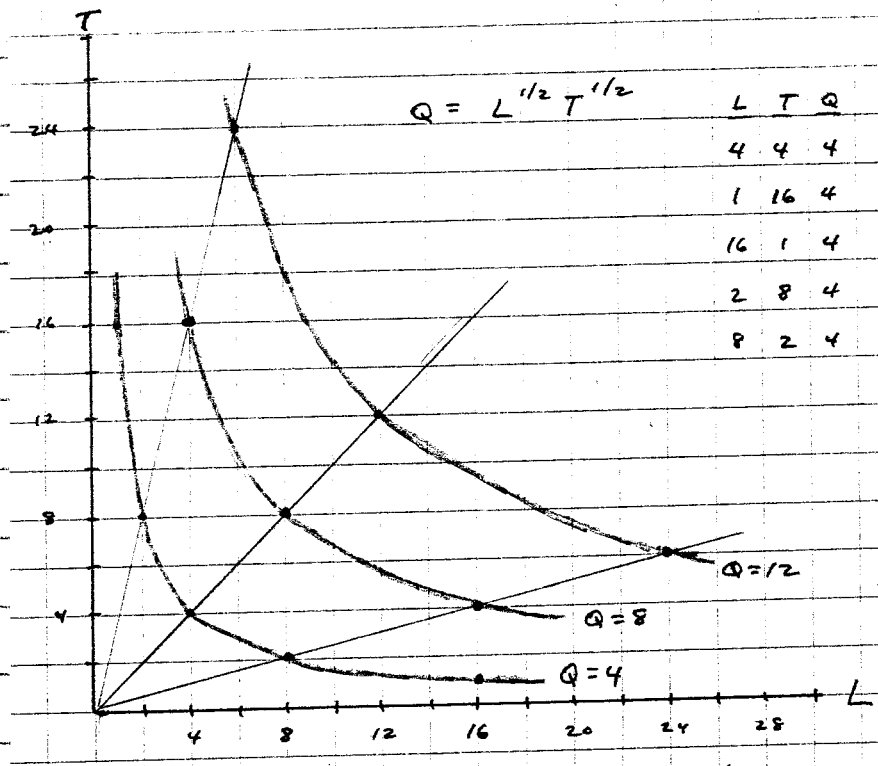
treating T as a constant, $MP_L = \frac{dQ}{dL} = \frac{1}{2} L^{-1/2} T^{1/2}$

treating L as a constant, $MP_T = \frac{dQ}{dT} = \frac{1}{2} T^{-1/2} L^{1/2}$

$MRTS_{L,T} = \frac{MP_L}{MP_T} = \frac{1/2\ L^{-1/2}\ T^{1/2}}{1/2\ T^{-1/2}\ L^{1/2}} = \frac{T}{L}$

at $[L = 4, T = 4]$ $MRTS_{L,T} = \frac{4}{4} = 1$, which is confirmed by the graphical solution above.

5.



$Q = L^{1/2} T^{1/2}$

L	T	Q
4	4	4
1	16	4
16	1	4
2	8	4
8	2	4

L	T	Q
8	8	8
4	16	8
16	4	8

L	T	Q
12	12	12
6	24	12
24	6	12

Constant returns to scale!