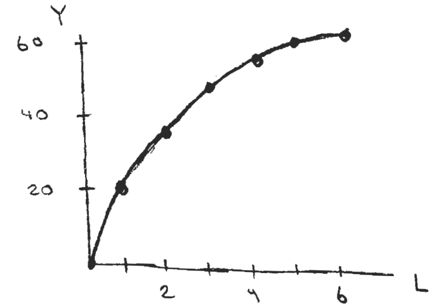
Econ 3510

Problem Set #3

Answer Key

1.

a.

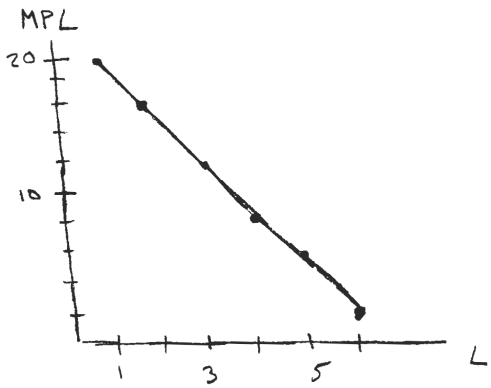


The slope is positive, indicating that the number of loaves increases as more workers are added. The slope diminishes as L rises, indicating that production exhibits diminishing marginal product of labor.

b.

L	Y	MPL
0	0	–
1	20	20
2	36	16
3	48	12
4	56	8
5	60	6
6	62	2

c.



The slope of the curve is negative, indicating that the MPL decreases as L rises.

d.

MPL	P	P x MPL	L
–	$2	–	0
20	$2	$40	1
16	$2	$32	2
12	$2	$24	3
8	$2	$16	4
6	$2	$12	5
2	$2	$4	6

e. W = $16

P x MPL = W

$\boxed{L=4}$ when P x MPL = $16

2. $Y = \sqrt{KL}$

a. $Y = \sqrt{100 \times 25} = 50$

b. Constant returns to scale means that if we increase both factors of production by an equal percentage, output rises by the same percentage.

K	L	Y
100	25	50
200	50	100
2500	625	1250

c. $MPL = \sqrt{100 \times 26} - \sqrt{100 \times 25} = .990195 \approx 1$

d. $MPK = \sqrt{101 \times 25} - \sqrt{100 \times 25} = .249378 \approx 1/4$

e. $\frac{W}{P} \times L = MPL \times L = 1 \times 25 = 25$

$\frac{R}{P} \times K = MPK \times K = \frac{1}{4} \times 100 = 25$

$Profit = Y - MPL \times L - MPK \times K$

$= 50 - 25 - 25 = 0$

$\therefore \; MPL \times L + MPK \times K = Y$

3. $Y = F(K, L) = 1200$.

$Y = C + I + G$

$C = 125 + .75(Y - T)$

$I = 200 - 10r$

$G = 150 \quad T = 100$

a. $C = 125 + .75(1200 - 100) = 950$

b. $S = Y - C - G = 1200 - 950 - 150 = 100$

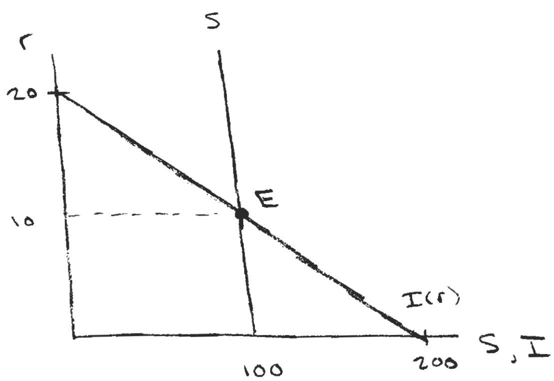
c. $S = I(r)$

$\Rightarrow \quad 100 = 200 - 10r$

$10r = 100$

$\boxed{r = 10} \qquad \boxed{I = 100}$

d.



$r = 20 - \frac{1}{10} I$

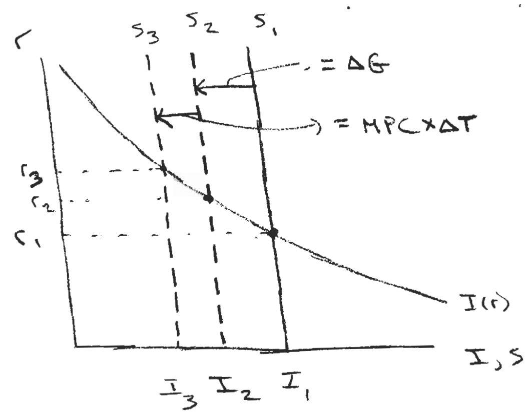
e. $S_p = Y - T - C = 1200 - 100 - 950 = 150$

$S_g = T - G = 100 - 150 = -50$

$S = S_p + S_g = 150 - 50 = 100$

4.

a.



$S = Y - C(Y-T) - G$

* If G increases by ΔG, S falls by ΔG. This increases r to r_2 and lowers I by ΔG to I_2

* If T fall by ΔT, Disposable income rises by ΔT, consumption rises by $MPC \times \Delta T$, and S falls by $MPC \times \Delta T$. This increases r further to r_3 and lowers I by an additional $MPC \times \Delta T$ to I_3