Solutions to Final Exam

Version A

1. (a) \( P_m \) \( P_m \)

\[ Q \]

(b) \( P \)

\[ P \]

Less increase in \( Q \) than in part (c) possibly even a decrease.

(c) Simplest answer is that here total surplus = consumer surplus (due to horizontal) and this has fallen due to higher \( P_m \). Price

[More complicated answer is that most likely with time of day

pricing \( P_m < P_m \) and possibly surplus will rise].

2. (a) \$y

\[ 
\text{Before} \\
\text{Costco}
\]

\[ 
\text{U}_{\text{Costco}} \quad \text{U}_{\text{Before}}
\]

In (a) the budget line has lower \( y \) intercept and is flatter.

(b) Different answers are possible.

As drawn better off as higher indifference curve.

(c) Definitely better off.

10\% discount on \$400 equals \$40 which is Costco member fee.

So same cost either way, but Costco permits pure substitution effect

switch to cheaper food and better off.

3. (a) \$ \( P \)

\[ Q \]

Market price \( \uparrow \Rightarrow Q \uparrow \)

(b) \( P \)

\( Q \)

\( Q_T \) and ultimately

\( P \) as decreasing

\( = \) costs industry.

(c) Upward sloping.

Each firm has

upward sloping \( MC \).

As industry gets

larger firms with

higher min. \( AC \)

enter.
4. (a) \[ \text{MPP}_L = \frac{dQ}{dL} = \frac{d}{dL} (5L^{0.25}) = 5 \times 0.25 \times L^{-0.75} = 3.75 \times 10^2 \times 100 = \$262,500 \]

(b) \[ \text{MCL} = \frac{\text{units of labor to produce 1 more table}}{\text{cost of unit of labor}} = (\text{MPP}_L)^{-1} \times \text{wage} = (1.375)^{-1} \times 100 = \$73.45 \]

(c) First get \( \text{MRTS}_{KL} \):

\[ \text{Q} = 100 \times 0.25 \Rightarrow 100 = 100 \times 0.25 \Rightarrow K = \frac{100}{0.25} \]

So \( \text{MRTS}_{KL} = -\frac{\text{dQ}}{\text{dL}} = 3 \times \frac{\text{Q}}{L} = 3 \left( \frac{100}{0.25} \right) = 3 \left( \frac{5,000}{10,000} \right) = 3 \]

Also \( \frac{P_L}{P_K} = \frac{100}{500} = \frac{1}{5} \). Mix is not optimal since \( \text{MRTS}_{KL} \neq \frac{P_L}{P_K} \)

5. Note: different answers possible due to different origin (Ian or Fiona).

(a) Initial allocation is A.

(b) Pareto efficient allocation is B, for example.

(c) Tangency and both better off.

6. (a) If \( \text{MRS}_{PD} \) needs to be equated:

It equals \( \frac{100}{P_L} \) for Ian and \( \frac{25}{P_L} \) for Fiona.

Then \( \frac{100}{P_L} = \frac{25}{P_L} \Rightarrow P_L \text{Ian} = 100 \times P_L \text{Fiona} \Rightarrow P \text{Ian} = 2 \times P \text{Fiona} \)

Ian will have twice as many Digimon.

6. (a) Only way to make one person better off is to make someone else worse off.

(b) Each consumer sets \( \text{MRS}_{xy} = \frac{P_x}{P_y} \).

Since they each face the same price, it must be that \( \text{MRS}_{xy} \) are equal.

(c) No, Pareto efficiency does not imply equity, and government is also concerned about equity.
7. (a) \( \frac{d}{\text{d}Q} P \)

(b) \( \frac{\% \Delta Q}{\% \Delta P} \)

\[ > - \frac{1}{3} \approx -0.33 \]

Price elasticity is \(-0.14\) (or even less)

(c) Probably not. \( \alpha \) is close to zero, so should \( \alpha \) be close to zero. But here revenue increased by 32%, as prices rose. Should jack prices up even more.

8. (c) MILE

Since \( Q = 2000 - 20P \)

we have \( P = 100 - 0.05Q \)

(a) \( 100 - \frac{1}{20}Q = 20 \)

\[ \Rightarrow Q = 1600 \text{ Billion miles} \]

(b) \( 100 - \frac{1}{10}Q = 30 \)

\[ \Rightarrow Q = 1400 \text{ Billion miles} \]

(i) Loss is the shaded area

\[ = \frac{1}{2} \times (1600 - 1400) \times (30 - 20) = \frac{1}{2} \times 200 \times 10 = 1000 \text{ billion cents} = \$10 \text{ billion} \]

9. (a) \( \frac{d}{\text{d}Q} \)

Note that \( TC = 500,000 \times Q \)

\( \Rightarrow \) \( MC = 500,000 \)

(b) \( MB = MC \)

\[ \Rightarrow 4,000,000 - 1,000Q = 500,000 \]

\[ \Rightarrow Q = 3,500 \text{ beds} \]

(c) No. Consumption here is rival. One person's use of a hospital bed prevents another from using it.

(i.e., it is excludable so could be privately provided.)
**Elco F01**

**Version B**

Q1 - Q3 Same as Version A

(a) \[ MP_L = \frac{dQ}{dL} = \frac{d}{dL} (5L^{0.75}) = 5 \times 0.75 \times L^{-0.25} = 3.75 \times (10,000)^{-0.25} = \frac{3.75}{10} \]

(b) \[ MC = \text{units to produce 1 more table} \times \text{cost of unit of labor} \]
\[ = (MP_L)^{-1} \times \text{wage} = 1.375 \times 200 = \$533.33 \]

(c) First get \[ MRTS_{KL} \]
\[ Q = K^{0.25} L^{0.75} \]
\[ \Rightarrow Q^4 = K L^3 \Rightarrow K = \frac{Q^4}{L^3} \]

so \[ MRTS_{KL} = -\frac{dQ}{dL} = \frac{3Q^4}{L^4} = 3 \left( \frac{5000}{10,000} \right)^{0.25} = \frac{3}{10} \]

also \[ P \frac{dQ}{dK} = \frac{200}{520} = \frac{1}{5} \text{. Mx is not optimal since } MRTS_{KL} < \frac{1}{5} \]

Q5 - Q7 same as Version A

Q9 Same

**Diagram**

1. **Mult. Choice Question**

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**Out of 80**

- 75th percentile: 58
- 50th percentile: 49
- 25th percentile: 38

**Grade on Exam**

- A: 68 or better
- B+: 60 - 67
- B: 55 - 57
- B-: 50 - 55
- C+: 43 - 49
- C: 40 - 43
- D+: 37 - 40
- D: 34 - 37
- D-: 31 - 34