

Practice Set 1

Basics & Prerequisites

This set contains problems for your own practice. Do not just read the provided solutions — try to solve the problems first, and use the solutions only when you are stuck. Reading solutions without attempting the problems first has the same value for your preparation as watching someone else run a marathon and then expecting to be able to run it yourself. If you are unable to comprehend the solution of a problem even after reading the instructional answer key, you have most likely missed the relevant part of the material underlying this problem. Direct any questions about this problem set to your section's teaching assistant.

1. The following table contains information on the qualifications, sex, and annual wage of 4 employees.

	Degree	Languages	Sex	Annual Wage
Kate	Bachelor	English, Mandarin	F	\$90K
Emma	Master's	English	F	\$110K
Olivia	Master's	English, Mandarin	F	\$140K
David	Ph.D.	English	M	\$170K

- (a) What is the effect of obtaining a Master's degree on annual wage?
- (b) What is the effect of speaking Mandarin on annual wage?
- (c) What is the effect of sex on annual wage?
2. Nancy is a personal trainer. At the market price of \$40 per hour, she can find plenty of clients. Nancy also owns video equipment and once a month films a YouTube video for her channel 'Pilates with Nancy.' It takes her around 6 hours to produce a video from start to finish. On average, each video brings her \$500 in ad revenue. If Nancy were not producing videos, she could rent out her equipment for \$150 per month.
- (a) What is the *accounting cost* of a video?
- (b) What is the *economic cost* of a video?
- (c) What is Nancy's *accounting profit* from a video, and what information does this provide?
- (d) What is Nancy's *economic profit* from a video, and what information does this provide?
- (e) What is Nancy's *economic profit* from a video if a significant increase in demand for personal training raises the market price to \$65 per hour?

3. The following table shows the total utility (U) I receive from eating cheesecake.

Slices	0	1	2	3	4
U	5	15	24	24	12

- (a) Why could I receive 5 units of utility if I have no cheesecake?
- (b) Calculate the average utility (AU) for each slice by dividing total utility by the number of slices. Calculate the marginal utility (MU) as the contribution of each additional slice to total utility.
4. Consider the equations for the lines $y = 10 + 3x$ and $y = 100 - 2x$. Find x and y at the intersection of the two lines.

Answer Key

1. The following table contains information on the qualifications, sex, and annual wage of 4 employees.

	Degree	Languages	Sex	Annual Wage
Kate	Bachelor	English, Mandarin	F	\$90K
Emma	Master's	English	F	\$110K
Olivia	Master's	English, Mandarin	F	\$140K
David	Ph.D.	English	M	\$170K

- (a) What is the effect of obtaining a Master's degree on annual wage?

The only comparable pair regarding this question is Olivia and Kate, for whom all variables are equal except their degree. Olivia holds a Master's and earns \$50K more per year than Kate. We can therefore infer that the difference in wage is due to Olivia's higher degree, ceteris paribus.

- (b) What is the effect of speaking Mandarin on annual wage?

The only relevant comparable pair is Emma and Olivia, for whom all variables are equal except their knowledge of Mandarin. Olivia earns \$30K more than Emma annually. We can therefore infer that speaking Mandarin leads to a higher wage, ceteris paribus.

- (c) What is the effect of sex on annual wage?

The only male in the dataset is David, who cannot be compared to any of the women because he holds a Ph.D. while none of them do. If we compare David with Emma, for instance, we cannot determine whether the wage difference is due to his degree or his sex. The ceteris paribus condition is not satisfied for any male-female pair in this dataset, and thus we cannot determine the effect of sex on annual wage.

2. Nancy is a personal trainer. At the market price of \$40 per hour, she can find plenty of clients. Nancy also owns video equipment and once a month films a YouTube video for her channel 'Pilates with Nancy.' It takes her around 6 hours to produce a video from start to finish. On average, each video brings her \$500 in ad revenue. If Nancy were not producing videos, she could rent out her equipment for \$150 per month.

- (a) What is the *accounting cost* of a video?

For each video, Nancy incurs no out-of-pocket expenses — she produces the entire thing using equipment she already owns. Her accounting cost per video is therefore \$0.

- (b) What is the *economic cost* of a video?

Nancy spends 6 hours on each video, and each hour is worth \$40 — her market rate for personal training. Her total opportunity cost of time is $6 \cdot \$40 = \240 . She also forgoes \$150 per month by not renting out her equipment, and since she produces one video per month, the opportunity cost of equipment is \$150 per video. The total economic cost of a video is $\$240 + \$150 = \$390$.

- (c) What is Nancy's *accounting profit* from a video, and what information does this provide?

Accounting profit = Revenue – accounting cost = $\$500 - \$0 = \$500$. This means that Nancy takes home \$500 per video.

- (d) What is Nancy's *economic profit* from a video, and what information does this provide?

Economic profit = Revenue – economic cost = $\$500 - \$390 = \$110$. This means that by producing a video, Nancy earns \$110 more than she would from her next best alternative — personal training for 6 hours and renting out her equipment for the month.

- (e) What is Nancy's *economic profit* from a video if a significant increase in demand for personal training raises the market price to \$65 per hour?

The economic cost of a video increases because the opportunity cost of Nancy's time has risen. The new economic cost is $6 \cdot \$65 + \$150 = \$540$. The economic profit from a video is $\$500 - \$540 = -\$40$. Nancy still takes home \$500 per video, but she would earn \$40 more by doing personal training and renting out her equipment instead.

3. The following table shows the total utility (U) I receive from eating cheesecake.

Slices	0	1	2	3	4
U	5	15	24	24	12

- (a) Why could I receive 5 units of utility if I have no cheesecake?

There could be many reasons. Perhaps by not eating cheesecake I can feel good about my diet or my health, which gives me 5 units of satisfaction. Zero consumption is not necessarily associated with zero utility.

- (b) Calculate the average utility (AU) for each slice by dividing total utility by the number of slices. Calculate the marginal utility (MU) as the contribution of each additional slice to total utility.

Slices	0	1	2	3	4
U	5	15	24	24	12
AU	-	15	12	8	3
MU	-	10	9	0	-12

Average utility is total utility divided by the number of slices consumed. Marginal utility is the change in total utility from consuming one additional slice. To calculate MU , subtract the total utility of the previous quantity from the total utility of the current quantity: for example, MU of the 1st slice = $15 - 5 = 10$, MU of the 2nd slice = $24 - 15 = 9$, and so on. Neither AU nor MU can be calculated for zero units.

4. Consider the equations for the lines $y = 10 + 3x$ and $y = 100 - 2x$. Find x and y at the intersection of the two lines.

Since both equations are equal to y , we can set them equal to each other: $10 + 3x = 100 - 2x$. Rearranging: $3x + 2x = 100 - 10$, so $5x = 90$, and therefore $x = 90/5$, or $x = 18$. Plugging $x = 18$ into either line: $y = 10 + 3x$, or $y = 10 + 3 \cdot 18$, or $y = 64$.

Please report any typos, mistakes, or suggestions for improvement to kmarinakis@smu.edu.sg.