

AAE635: Applied Microeconomic Theory

Discussion Section 1

Professor: Paul Dower

TA: Erick F Molina

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Dept. of Agricultural & Applied Economics
Taylor Hall 306, 427 Lorch St, Madison, WI 53706

[molina.perez@wisc.edu](mailto:molinaperez@wisc.edu)

Logistics

Discussion sections: Mondays 4:00-4:50pm – B30 Taylor Hall

Office hours: I will hold office hours on Mondays from 10am to 12:00pm in 215 Taylor Hall. In case you cannot make it to my office hours, we can arrange an appointment to discuss your questions. In those cases, please email me with your questions in advance.

Email policy: This is the preferred way to contact me. You can email me whenever you want – my email is at the top right of this page. I will try to answer in the next 24 hours. I will not be answering emails after 10pm or on Sundays.

Tips:

- Ask any questions you have. Sometimes several students have the same question, but no one asks it. So, by asking, you are probably answering someone else's question.
- Give feedback as to what you would like me to focus on.
- Try to plan ahead.

Today's goal

- Refresh core math tools for optimization.
- Connect the tools to micro applications.

Practice Questions

1. Solve the following two problems. Find all the critical points and classify them as local max, local min, saddle points, or none.

(a) $f : \mathbb{R} \rightarrow \mathbb{R}, \quad f(x) = x^4 - 2x^2.$

(b) $f : \mathbb{R}^3 \rightarrow \mathbb{R}, \quad f(x, y, z) = x^2 - xy + 4y^2 + xz + 4z^2 - 10x - 7y - 3z.$

2. Consider the following Cobb-Douglas utility function:

$$U(x, y) = x^\alpha y^{1-\alpha}$$

Write out the gradient vector and the Hessian matrix.

3. Given

$$f(x, y, z) = x^2 - y^2 + 5xz - 3yz, \quad x + y + z \neq 0,$$

answer:

- (a) Is this function homogeneous? If so, what is the degree of homogeneity?