

BEE1024 – Mathematics for Economists	Juliette Stephenson Amr Algarhi
Class Exercises Week 3	Department of Economics University of Exeter

Exercise 1 For the function

$$z = xy$$

find the slope of the level curves at the points $(1, 2)$ and $(2, 2)$.
(Slightly harder:) Find the equations for the tangents.

Exercise 2 Suppose a consumer has the utility function $u(x, y) = xy$ and her budget is 40. Given your knowledge of economics and the results from the previous question, what will be her demand when the prices are a) $p_x = p_y = 10$ and b) $p_x = 20, p_y = 10$?

Exercise 3 Find the critical point of the function

$$z = 20x^2 - 37xy + 31x + 15y^2 - 16y - 7$$

Exercise 4 A T-shirt shop carries two competing shirts, one endorsed by Michael Jordan and the other by Shaq O'Neal. The owner of the store can obtain both at a cost of \$2 per shirt and estimates that if Jordan shirts are sold for x dollars apiece and O'Neal shirts for y dollars apiece, consumers will buy approximately $40 - 50x + 40y$ Jordan shirts and $20 + 60x - 70y$ O'Neil shirts each day.

a) Express as functions of x and y : i) the revenue from selling Jordan shirts, ii) the revenue from selling O'Neal shirts iii) the costs for shirts and iv) the overall profit.

b) Find the critical point of the profit function.

Exercise 5 Use Cramer's rule to solve the system

$$\begin{aligned} 3x - 7y &= 13 \\ 2x + 5y &= 11 \end{aligned}$$