Course Preview: Microeconomics

This course preview is meant to give prospective learners the opportunity to get a taste of the content and exercises that will be covered in the course. While there are no prerequisites for this online course, it is recommended that learners have some familiarity with economics or statistics. Each question below is tied to concepts that will appear in this course, all of which it would be good to feel comfortable with. If you are new to these subjects, or eager to refresh your memory, please do consult the available resources below, and be prepared to refer to these resources over the course of the class. Try to first answer these questions without consulting the resources, but fear not if you do consult them - being an agile user of outside resources will help you succeed in this course.

A score of 60% or above in this course preview indicates that you are ready to take this course, while a score below 60% indicates that you should further review some concepts in the attached materials before commencing the course.

Useful Resources:

- *Overview of Calculus:* Harvard University on edX: Calculus Applied!
- *Useful Microeconomics Textbooks:*
  - Introductory game theory textbook: for instance, Strategy: An Introduction to Game Theory by Joel Watson (any edition is useful)
  - Introductory microeconomics textbook: for instance, Microeconomics by Jeffrey Perloff (any edition is useful)

1. **Price Markets:** Consider a fictional market for coffee. As a function of the price p, and demand $D(p)$ and supply $S(p)$ are given by

$$S(p) = a + bp \quad \text{and} \quad D(p) = c + dp,$$

where a, b, c, and d are constants. The following data was collected:

Price	**Supply**	**Demand**
3	11	3
5	17	1

- Find a, b, c, and d (2 points).
- At what price will demand equal supply, i.e., find p such that $D(p) = S(p)$ (.5 points).

2. **Cost Functions:** Consider the function $C(q) = 100 - 10q + 5q^2$ that associates each quantity q with a cost C. At what quantity is cost minimized (i.e., find q that minimizes $C(q)$) (2.5 points)?

3. **Elasticity:** The *elasticity* of a function $f(x)$ is defined by

$$\epsilon(x) = \frac{xf'(x)}{f(x)} \quad \text{where } f' \text{ is the derivative of } f.$$

Find the elasticity of the function $f(x) = \log x$ (2 points).

4. **Graphing Functions:** Consider the functions:

$$f(x) = 2x \quad \text{and} \quad g(x) = 6 - x.$$

- Find the intersection (x^*, y^*) of the two functions, i.e., find x^* and y^* such that $f(x^*) = y^* = g(x^*)$ (1 point).
- If you graph the functions $f(x)$ and $g(x)$ on the x-y plane, with $f(x)$ and $g(x)$ on the y-axis, find the area of the region that lies to the right of the line $x = 1$; below $g(x)$; and above the line $y = y^*$, where y^* is the value from the previous part (2 points). Hint: The region area is a triangle.