1.

Consumer A has Cobb-Douglas preferences: $U(x_1, x_2) = x_1^a x_2^b$,
where x_1 and x_2 are the amounts consumed goods 1 and 2.

a) What does the marginal utility (MU) measure?
Calculate marginal utilities MU_1 and MU_2 for both goods.   2p

b) What does the marginal rate of substitution (*MRS*) measure?
Calculate the marginal rate of substitution MRS_A for consumer A.   2p

Consumer B has the following Cobb-Douglas preferences: $V(x_1, x_2) = a \ln x_1 + b \ln x_2$.

c) Calculate the marginal rate of substitution MRS_B for consumer B.
Does utility function $V(x_1, x_2)$ represent the same preferences as $U(x_1, x_2)$? Explain.   2p

2.

Intertemporal choice, two period model:

Consumer has preferences: $U(c_1, c_2) = c_1 c_2$,
where c_1 is consumption in period 1 and c_2 is consumption in period 2.
Let m_1 and m_2 be the incomes received in periods 1 and 2.
The interest rate is r.
Ignore the price effects by setting the prices in periods 1 and 2 to one: $p_1 = p_2 = 1$.

a) Write down the intertemporal budget constraint? 2p

b) Consumer maximizes intertemporal utility.
Solve the optimized consumption levels $c_1^*(m_1, m_2, r)$ and $c_2^*(m_1, m_2, r)$. 3p

c) Set $m_1 = 10, m_2 = 21$ and $r = 5\%$.
Is the consumer a saver or a borrower? 1p

3.

Firm has a production function: $y = f(x_1, x_2) = x_1^{0.5} x_2^{0.5}$,
where x_i is the amount of input i and y is the amount of output.

a) Does the technology exhibit decreasing, increasing or constant returns to scale?
Derive your answer by using a scaling factor k. 2p

b) Derive the marginal products for both inputs (MP_1 and MP_2) as well as the technical rate of substitution (TRS). 2p

Assume that prices of the inputs are $w_1 = 1$ and $w_2 = 1$. The firm minimizes its costs, given the output level y.

c) Derive the cost-minimizing conditional input demands $x_1^*(w_1, w_2, y)$ and $x_2^*(w_1, w_2, y)$. 2p

4.

a) What is meant by (own) price elasticity of demand?
Calculate the elasticity of demand ε when the demand function is: $D(p) = 100p^{-3}$,
where p is price and $D(p)$ is the quantity demanded.
Is demand inelastic, elastic or unit elastic? 3p

b) Suppose that computers are produced by only one monopoly producer.
The monopolist's cost function is $c(q) = 40q$, where q is the amount of computers.
The inverse market demand for computers is given by $p(q) = 160 - 30q$.

Solve the profit maximizing level of output q^m for the monopolist. 3p

5.

a) Study the effect of a quantity tax on the market equilibrium in competitive markets.
The quantity tax is levied on the producers, i.e. study the effect of an excise tax.
Assume that supply and demand curves are linear; use graph(s) in your answer.

Illustrate the market equilibrium before and after the tax is levied.
How does the producer's surplus (PS) and consumer's surplus (CS) change after the imposition of the
tax? 3p

b) What is meant by an externality in economics?
Give one example of a positive externality and one example of a negative externality.
In the lectures, there was an example of negative production externality and how that might cause Pareto
inefficiency. List two possible ways to overcome this problem. 3p