1. (10%) Explain.
(a) Rate of Technical Substitution
(b) Slutsky Equation

2. (10%) Define the output elasticity of a factor i to be $\varepsilon_i = \dfrac{\partial f(x_1, x_2)}{\partial x_i} \dfrac{x_i}{f(x_1, x_2)}$,

$i = 1,2$. If $f(x_1, x_2) = x_1^a x_2^b$, what is the output elasticity of each factor?

3. (30%) Assume that utility is given by $U(X,Y) = X^{0.3} Y^{0.7}$ and the budget constraint is $P_x X + P_Y Y = I$, where P and I denote price and income.
(a) Find the uncompensated demand functions.
(b) Compute the indirect utility function.
(c) Compute the expenditure function.

4. (10%) A perfectly competitive market has 1,000 firms. In the very short run, each of the firms has a fixed supply of 100 units. The market demand is given by $Q = 160,000 - 10,000P$. Calculate the equilibrium price in the very short run.

5. (20%) A single firm monopolizes the entire market for widgets and can produce at constant average and marginal costs of $AC = MC = 10$. Originally, the firm faces a market demand curve given by $Q = 60 - P$.
(a) Calculate the profit-maximizing price-quantity combination for the firm.
(b) What are the firm's profits?

6. (20%) An individual has a fixed wealth (W) to allocate between consumption in two periods (C_1 and C_2). The individual's utility function is given by

$U(C_1, C_2)$, and the budget constraint is $W = C_1 + \dfrac{C_2}{1+r}$, where r is the

one-period interest rate.
(a) Show that in order to maximize utility how the individual should choose C_1 and C_2.
(b) Show that $\dfrac{\partial C_2}{\partial r} \geq 0$.