Name:

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All questions must be answered on this test form!
For each question you must show your work and (or) provide a clear argument.
All graphs must be accurate to get credit.

Question 1 Suppose the marginal rate of substitution is $MRS(x_1, x_2) = 5x_2/(3x_1)$. Suppose that prices are $p_1 = 2$, $p_2 = 3$, and the person's income is $I = 64$. Then the person's demand is *13 points*

$\mathbf{x_1 =}$	, $\mathbf{x_2 =}$

Question 2 A person's utility function is $u(x_1, x_2, L) = \ln(x_1) + \ln(x_2) + \ln(600 - L)$, where x_1 and x_2 are consumption of two goods and L is the amount of time the person works. Suppose that prices are $p_1 = 1$, $p_2 = 4$ and that the wage is $w = 20$. The person's income solely comes from labor. Thus, the person solves $\max_{x_1, x_2, L} \ln(x_1) + \ln(x_2) + \ln(600 - L)$ subject to $x_1 + 4x_2 \leq 20L$. *4 points*

The Lagrangean is given by

Determine the optimal level of L (recall that the derivative of $\ln(x)$ is $1/x$).

At the optimum L = *10 points*

Question 3 A utility function is given by $u(x_1, x_2) = 27x_1^2x_2$. The resulting demand functions are

$$x_1(p_1, p_2, I) = \frac{2I}{3p_1}, \quad , x_2(p_1, p_2, I) = \frac{I}{3p_2}.$$

Then the indirect utility function is

$\boldsymbol{v(p_1, p_2, I) =}$

4 points

The expenditure function is

$\boldsymbol{e(p_1, p_2, u) =}$

4 points

Hicksean demand for good 1 is

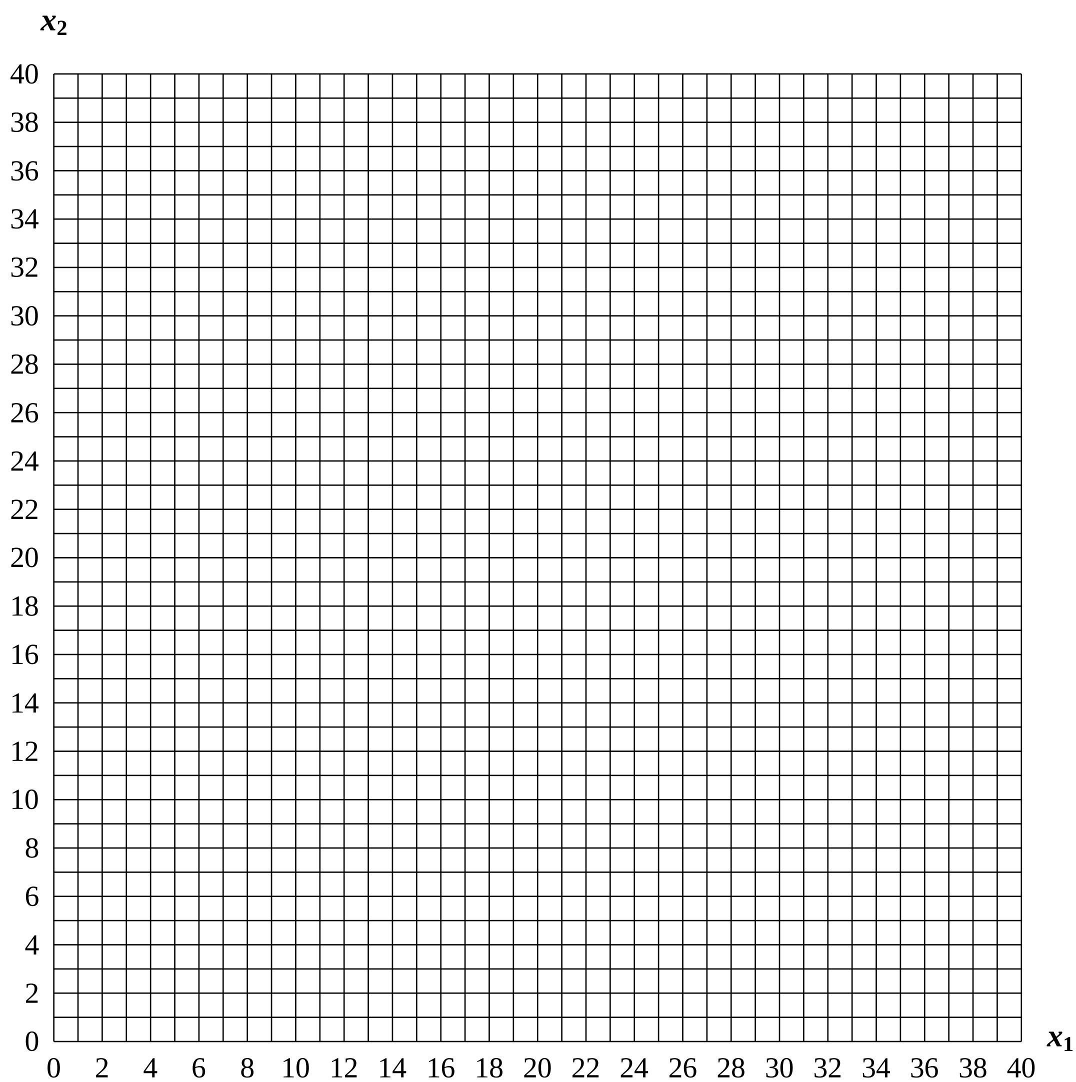
$\boldsymbol{h_1(p_1, p_2, u) =}$

4 points

Question 4 Suppose a person's income offer curves are always straight lines from $(0, 0)$ (for example, this is true for all CES utility functions). Suppose the person's income is $I = 90$. Originally, prices are $p_1 = 3$, $p_2 = 5$ and consumption is $(15, 9)$. Then the price of good 1 increases to $p_1 = 5$, and consumption changes to $(6, 12)$. Determine graphically the Slutzky income and substitution effect. *12 points*

The Slutzky substitution effect for goods 1 and 2 is $\boldsymbol{\Delta^s x_1 =}$ $\boldsymbol{\Delta^s x_2 =}$

The Slutzky income effect for goods 1 and 2 is $\boldsymbol{\Delta^I x_1 =}$ $\boldsymbol{\Delta^I x_2 =}$



Question 5 Suppose the demand functions are

$$x_1(p_1, p_2, I) = \frac{I}{2p_1}, \quad x_2(p_1, p_2, I) = \frac{I}{2p_2}.$$

Indirect utility is

$$v(p_1, p_2, I) = \frac{I}{\sqrt{p_1 p_2}},$$

and the expenditure function is

$$e(p_1, p_2, u) = u\sqrt{p_1 p_2}.$$

A person's income is $I = 900$, and prices are $p_1 = 1$, $p_2 = 1$. Then the government introduces a tax of 8 Dollars on each unit of good 1, raising the price to $p_1 = 9$. *12 points*

The government's tax revenue is

After tax utility is

Suppose prices are $p_1 = p_2 = 1$. At what income level I' would the person get the above after tax utility.

I' =

The deadweight loss of the tax is therefore

Question 6 A person has mean variance preferences of the form $40E[X] - \text{Var}[X]$, where X is the random variable that describes the portfolio return.

Suppose the person has 100 Dollars. He invests α Dollars in a risky asset with mean return 1.5 and a variance of 0.2. The remainder $(100 - \alpha)$ is invested in a riskless asset with return 1.1. Thus, the portfolio's mean return is $1.5\alpha + 1.1(100 - \alpha)$ and the variance is $0.2\alpha^2$.

The optimal α = *12 points*

Question 7 A person has a net worth of $I = 120,000$. The person can either get a job which would pay $40,000 or start a business. The business requires an initial investment of $110,000. With probability $1 - p$ it is a complete failure, i.e., the payoff of the business is 0 (and of course the owner loses his initial investment). With probability p the business is a success, in which case it pays $350,000 (so the net payoff is $240,000).

(a) Suppose the person's Bernoulli utility function is $u(x) = \sqrt{x}$. Determine the value of p at which the person is indifferent between starting the business and getting the job. *5 points*

To start the business $p \geq$

(b) Now consider someone with the Bernoulli utility function $u(x) = -1/x$. Determine the value of p at which this person is indifferent between starting the business and getting the job. *5 points*

To start the business $p \geq$

(c) Who is more risk averse? (circle the correct answer) *3 points*

The Person in (a)	**The Person in (b)**

Explain:

Question 8 A lottery has the following possible payoffs: With probability 1/10 the payoff is 36 Dollars. With probability 1/5 the payoff is 9 Dollars and with probability 1/2 the payoff is 1 Dollar; with the remaining probability the payoff is zero. Suppose the person's Bernoulli utility is $\sqrt{x}$.

(a) Then *6 points*

The certainty equivalent of the lottery is

(b) Now suppose that the highest payoff is *m* instead of 36 Dollars. Determine the value of *m* such that certainty equivalent is 3 Dollars.

***m* =**

6 points