ECON 203
Midterm on Consumer Theory

Be sure to show your work for all answers, even if the work is simple.
This exam will begin at 17:40 and end at 19:20

1. *(*15 *points)* **Honor Statement:** Please read and sign the following statement:

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2. *(21 points total)* Let $h_x(p_x, p_y, u)$ be the Hicksian or income compensated demand for x, $I(p_x, p_y, u)$ the amount of income necessary for a consumer to achieve a utility level of u, and $X(p_x, p_y, I)$ be their normal or Marshallian demand for x. You may assume that $\frac{\partial I}{\partial p_x} = x$, and $h_x(p_x, p_y, u) = X(p_x, p_y, I(p_x, p_y, u))$.

   (a) *(8 points)* Derive the Slutsky equation in elasticity form, defining each term as you go.

   (b) *(3 points)* Define a Giffen good.

(c) *(6 points)* Using the Slutsky equation explain how a good can be a Giffen good, and why the search for these goods have primarily focused on staple goods—a type of food that constitutes most of what the very poor eat. What is the only statistically verified Giffen good found to date?

(d) *(4 points)* A government wants to increase the health of their people, and are considering subsidizing the staple food, but they know that at least for some of the people this staple food is a Giffen good. Argue both that regardless of this they should subsidize the staple, and that because of this they should not subsidize the staple. What is the key factor that determines whether they should subsidize the staple or not?

3. *(23 points total)* Consider the utility function $U(F, C) = F^{\frac{1}{4}} C^{\frac{2}{3}}$.

(a) *(2 points)* Set up the Lagrangian you would use to find the optimal consumptions over the budget set $p_f F + p_c C \leq I$.

(b) *(4 points)* Find the first order conditions of this objective function.

(c) *(2 points)* Solve for a function for F in terms of C and prices.

(d) *(2 points)* Find the demand for C.

(e) *(5 points)* Find the demand for F using two different methods and verify that your answer is correct.

(f) *(8 points)* Find the elasticity of F with respect to p_c and I, and the share of income that is spent on food. Why the elasticity of food with respect to income a problem?

4. *(15 points total)* About *rationality*

(a) *(3 points)* What is the motivation for Economists (as social scientists) to assume rationality?

(b) *(9 points)* Write down and define the three axioms that are required for the normative definition of rationality.

(c) *(3 points)* For one of the three axioms you just defined, show what indifference curves would look like if they did not satisfy that axiom.

5. *(26 points total)* Consider the utility function $U(F, C) = 2F + 7C$.

(a) *(6 points)* Find the marginal utilities of food and clothing, is this utility function (strongly) monotonic? Is it convex?

(b) *(2 points)* Set up the Lagrangian for maximizing this over the budget set $p_f F + p_c C \leq I$.

(c) *(6 points)* Find the first derivatives of this objective function. Which of these are you certain must be equal to zero in any optimum? Why?

(d) *(4 points)* Define a *corner solution*. In the real world are corner solutions common or rare? Explain your answer.

(e) *(4 points)* Show that for almost all (p_f, p_c) this consumer will be at a corner solution.

(f) *(4 points)* Find the demand for F, you do not need to worry about the rare cases where the consumer is not at a corner solution.

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3. *(23 points total)* Consider the utility function $U(F, C) = F^{\frac{1}{2}} C^{\frac{3}{5}}$.

(a) *(2 points)* Set up the Lagrangian you would use to find the optimal consumptions over the budget set $p_f F + p_c C \leq I$.

(b) *(4 points)* Find the first order conditions of this objective function.

(c) *(2 points)* Solve for a function for F in terms of C and prices.

(d) *(2 points)* Find the demand for C.

(e) *(5 points)* Find the demand for F using two different methods and verify that your answer is correct.

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5. *(26 points total)* Consider the utility function $U(F, C) = 4F + 6C$.

(a) *(6 points)* Find the marginal utilities of food and clothing, is this utility function (strongly) monotonic? Is it convex?

(b) *(2 points)* Set up the Lagrangian for maximizing this over the budget set $p_f F + p_c C \leq I$.

(c) *(6 points)* Find the first derivatives of this objective function. Which of these are you certain must be equal to zero in any optimum? Why?

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(e) *(4 points)* Show that for almost all (p_f, p_c) this consumer will be at a corner solution.

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