# 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 12:05 in AZ25, 12:10 in AZ27 and 12:15 in
A125.
It will end 100 minutes later.

1. *(12 points)* **Honor Statement:** Please read and sign the following state-
   ment:

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   reference to any notes, books, or the assistance of any other person. I
   will also neither help others nor use a calculator or other electronic aid for
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2. *(35 points total)* In a YouTube video Drew Gooden explained how he first
   waited until it was almost too late to watch a series on Netflix, and then
   bought the Blu-ray collection for $150 to finish the series. He then realized
   his CD player would not play blu-ray discs, and he bought a blu-ray player
   for $120. Finally he realized he didn't have software for watching Blu-rays,
   and spent 85$ on that. He stated this was an example of the *sunk cost
   fallacy*—which I must admit is a much cooler way of describing the insight
   than "sunk costs are sunk costs."

   (a) *(3 points)* Define a *sunk cost*. I simply want a definition, not exam-
       ples.

   (b) *(4 points)* What is the "sunk costs fallacy" or, as I put it, "sunk costs
       are sunk costs"? I am looking for a simple explanation without any
       examples.

   (c) *(4 points)* Is he correct? You should assume he cannot resell anything
       in your answer.

1

(d) *(6 points)* If he did consider reselling (which he did not) how would that change your answer? What new fundamental economic concept would become relevant?

(e) *(6 points)* Write down the three axioms that are required for normative rationality, and define each one.

(f) *(2 points)* What implicit assumption do we make about our subject's intelligence do we make when we assume they are rational.

(g) *(6 points)* If we include the implicit assumption, is Drew rational? If we do not, is he rational now? Explain your answer.

(h) *(4 points)* Why is it important to assume our subjects are rational even when we are faced with such silly behavior? What motivates this assumption?

3. *(28 points total)* Heddy has the utility function $U(F,C) = C - \frac{49}{F}$ where $F \geq 0$ and $C \geq 0$.

(a) *(4 points)* Show that this utility function is strictly monotonic for $F \geq 0$ and $C \geq 0$. You may assume this below even if you cannot prove it.

(b) *(2 points)* Heddy wants to maximize his utility over the budget set $p_f F + p_c C \leq I$ where $p_f > 0$, $p_c > 0$ and $I > 0$. Set up the Lagrangian objective function we want to maximize.

(c) *(4 points)* Find the first derivatives of this objective function.

(d) *(4 points)* Which of these derivatives will be equal to zero in any optimum? Which might be strictly negative? Explain.

(e) *(4 points)* Assuming that all first derivatives are equal to zero, find the demand for $F$ by equalizing bang for the bucks. **NOTE:** It will not be affected by Income.

(f) *(4 points)* Assuming that all first derivatives are equal to zero, find the demand for $C$.

(g) *(6 points)* When and which of the first derivatives might be strictly negative? Explain.

4. *(25 points total)* The duality theorem tells us that:

$$h_x\left(p_x, p_y, p_z, u\right) = X\left(p_x, p_y, p_z, I\left(p_x, p_y, p_z, u\right)\right)$$

and the envelope theorem tells us that $\frac{\partial I}{\partial p_x} = x$, $\frac{\partial I}{\partial p_y} = y$, $\frac{\partial I}{\partial p_z} = z$. (You may assume that all exogenous variables—$(p_x, p_y, p_z, u)$—are strictly positive.)

(a) *(9 points)* Derive the Slutsky equation in elasticity form, defining each term in the final equation as you derive them.

(b) *(4 points)* Which term(s) represent the substitution effect, which represent the income effect? Explain

(c) *(3 points)* What is a *Giffen good*? Why are they strange? Why do we care about such a rarely observed type of good?

(d) *(3 points)* What is the only empirically verified Giffen good?

(e) *(6 points)* Using the Slutsky equation, explain why the only empirically verified Giffen good is an excellent candidate for being a Giffen good.

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3. *(28 points total)* Heddy has the utility function $U(F, C) = C - \frac{36}{F}$ where $F \geq 0$ and $C \geq 0$.

(a) *(4 points)* Show that this utility function is strictly monotonic for $F \geq 0$ and $C \geq 0$. You may assume this below even if you cannot prove it.

(b) *(2 points)* Heddy wants to maximize his utility over the budget set $p_f F + p_c C \leq I$ where $p_f > 0$, $p_c > 0$ and $I > 0$. Set up the Lagrangian objective function we want to maximize.

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3. *(28 points total)* Heddy has the utility function $U(F,C) = C - \frac{27}{2F^2}$ where $F \geq 0$ and $C \geq 0$.

 (a) *(4 points)* Show that this utility function is strictly monotonic for $F \geq 0$ and $C \geq 0$. You may assume this below even if you cannot prove it.

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3. *(28 points total)* Heddy has the utility function $U(F,C) = C - \frac{32}{F^2}$ where $F \geq 0$ and $C \geq 0$.

(a) *(4 points)* Show that this utility function is strictly monotonic for $F \geq 0$ and $C \geq 0$. You may assume this below even if you cannot prove it.

(b) *(2 points)* Heddy wants to maximize his utility over the budget set $p_f F + p_c C \leq I$ where $p_f > 0$, $p_c > 0$ and $I > 0$. Set up the Lagrangian objective function we want to maximize.

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3. *(28 points total)* Heddy has the utility function $U(F, C) = C - \frac{8}{F^4}$ where $F \geq 0$ and $C \geq 0$.

(a) *(4 points)* Show that this utility function is strictly monotonic for $F \geq 0$ and $C \geq 0$. You may assume this below even if you cannot prove it.

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