

# ECON 339 - Fall 2026

## Exam 1

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- Define any variables and/or state any assumptions you need to answer the problems.
  - All materials should be put away before beginning the exam. Use of cell phones during the exam for any purpose is forbidden. The Honor Code applies to this exam.
  - Please write your answers in the space provided.
  - Keep your answers for explanations short but clear. Your goal is to convince a skeptical grader that you understand the relevant concepts well enough to answer the question you are given. Cite specific concepts from class for full credit.
  - The questions on the exam sum to 72 points.
  - Good luck on your Econ test!
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1. (1 point) What is your name?
2. (1 point) What section are you in? (Either section number or what time your class meets)

# 1 True/False Questions

Indicate “T” rue or “F” alse for each of the following statements or claims. If you correctly explain why a statement or claim is false, I will give you a bonus point up to a 100% on this homework.

3. (2 points) **Claim:** An utility-maximizer with quasi-hyperbolic time preferences exhibits dynamic inconsistency.
4. (2 points) Suppose a utility maximizer has an intertemporal utility function with exponential time-discounting. Also suppose the maximizer has solved their intertemporal utility maximization problem  
**Claim:** If the person’s  $\beta$  were to increase and the real interest rate were to decrease, the effect of these changes on a person’s optimal consumption in period  $t$  is unclear without more information.
5. (2 points) Darcy is trying to decide if she has solved her optimization problem correctly regarding the number of packs of healthy snacks and the number of packs of unhealthy snacks to buy from Target. She currently has 10 packs of healthy snacks and 2 packs of unhealthy snacks in her Target cart. At this bundle if she adds another pack of healthy snacks her utility will increase by 1 and if she adds another pack of unhealthy snacks her utility will increase by 5. The price of healthy snacks is twice as expensive as the price of unhealthy snacks. **Claim:** Based on what we have learned in class, Darcy has done her optimization problem correctly.
6. (2 points) Suppose Teddy is a quasi-hyperbolic discounter. Prior to this semester, he was fully naive, but attending ECON 339 lectures caused him to become fully sophisticated. **Claim:** Taking ECON 339 therefore removed Teddy’s present bias and he will not suffer from any of the negative consequences of present bias anymore.
7. (2 points) **Claim** Many people care about what others think about them. Such social image concerns can be an important motivator for helping others, for example by giving them money

## 2 Multiple Choice Questions

Choose the best answer for each question. There is ONLY one correct answer for each question. No explanation necessary.

8. (2 points) Suppose a consumer with Utility function  $U = xy$  faces prices  $p_x = 1, p_y = 2$ , and  $w = 10$ . After the consumer picks their utility-maximizing bundle, the utility-maximizer realizes prices are actually  $p_x = 2, p_y = 1$ , and  $w = 10$ . Which of the following best explains how the utility-maximizer would re-allocate his budget when purchasing  $x$  and  $y$ ?
- A. The utility maximizer does not alter their bundle.
  - B. We need more information.
  - C. The utility maximizer buys more  $x$  and fewer  $y$ .
  - D. The utility maximizer buys more  $y$  and less  $x$ .
9. (2 points) You work a job that pays you \$100 every 14 days. Suppose you just got paid, so your next pay check is 14 days from today. If the interest rate per day is  $r$ , how much money would I need to pay you today for you to be indifferent between that amount of money and your paycheck 14 days from today?
- A.  $\frac{100}{(1+r)^{13}}$
  - B.  $100 \cdot (1+r)^{13}$
  - C.  $\frac{100}{(1+r)^{14}}$
  - D.  $100 \cdot (1+r)^{14}$
10. (2 points) You win a TikTok giveaway, where you receive your cash prize over two separate time periods, and the interest rate is  $r$ . Let's call the prize in period 1  $p_1$  and the prize you receive in period 2  $p_2$ . You decide to spend all of it in period 1, which means you get a loan from a friend since you have not yet received your second prize payment in period 1. Your friend still charges you interest. What is the maximum you can spend in period 1 without defaulting on your loan to your friend?
- A.  $p_1 + p_2(1+r)$
  - B.  $p_1(1+r) + p_2$
  - C.  $\frac{p_1}{1+r} + p_2$
  - D.  $p_1 + \frac{p_2}{1+r}$
11. (2 points) Suppose a professor wanted to find out the ideal rate to pay participants in economics experiments at Hamilton. To do so, the professor offered four groups of students a different pay rate per task completed successfully in the lab. These tasks focused on students' ability to pay attention and follow directions correctly, as a proxy for participant engagement. The experiment lasted one hour and consisted of 4 15-minute tasks. Students were randomized to each group. Students in group 1 received \$5 per successfully completed task, students in group 2 received \$2 per successfully completed task, and students in group 3 received \$8 per successfully completed task. Students in group 4 did not receive any payment for successfully completed tasks. All students received a \$7 show-up fee. Students in group 3 and 1 completed all tasks, while students in groups 2 and 4 completed half the tasks successfully. **Question:** What is the lowest hourly rate, in addition to the show-up fee, that the experimenter could pay to Hamilton students in order to ensure participant attention?
- A. \$20.
  - B. \$8.
  - C. \$15.
  - D. \$2.

12. (2 points) Suppose my utility function from eating candy in my office is given by  $U = \sqrt{x}$ , where  $x$  is the number of mini-candy bars I consume in a given day. Also suppose my utility function is characterized by exponential discounting. **Question:** If I am indifferent between eating 9 mini-candy bars today and 16 mini-candy bars tomorrow, what is my estimated daily discount factor?
- A.  $\frac{4}{3}$ .
  - B.  $\frac{16}{9}$ .
  - C.  $\frac{3}{4}$ .
  - D.  $\frac{9}{16}$ .

### 3 Short Answer Questions

These questions all require math, diagrams, and/or written explanations. Remember you are trying to convince me you understand the why and how of what you are doing, not simply that you are able to get the numerical/graphical answer correct. Include specific concepts from class in your written explanations for full credit.

13. **The Ultimatum Game.** This is how the game works. There are two players, Player A and Player B. Player A must decide how to divide a pool of \$20 between themselves (Player A) and Player B. Player A sends their proposed split of this \$20 to Player B. Player B can either accept or reject this split. If Player B accepts the split, the money for that round is divided according to Player A's proposal. If Player B rejects this split, both players get nothing. Players play 10 rounds, all independent, and Players A and B are randomly rematched each round, but a given participant retains the same role throughout all 10 rounds. The indemnities of players are anonymous during and after the experiment. Payment for this experiment is based on one randomly selected round plus a \$7 show-up fee.
- (a) (6 points) How would two fully rational economic agents play this game?
  - (b) (6 points) How do you expect actual humans to behave in this game?
  - (c) (8 points) Using concepts from papers read as part of our class, why do expect such differences in behavioral between fully rational agents and real-life people?
14. **Present Bias and Time Discounting** Suppose Bill is thinking of his intertemporal optimization problem over 2 periods  $(t, t - 1)$  in which Bill receives incomes  $y_t, y_{t-1}$  in each period and chooses consumption  $c_t, c_{t-1}$ . Assume  $p_t = p_{t-1} = 1$ , so there is no inflation and all values are real rather than nominal.
- (a) (8 points) Suppose Bill's intertemporal utility function is exponential and given by  $U(c_t, c_{t+1}) = \ln c_t + \beta \ln c_{t+1}$ , with  $MU_{c_t} = \frac{1}{c_t}$  and  $MU_{c_{t+1}} = \frac{\beta}{c_{t+1}}$ . Find Bill's optimal consumption  $c_t^*, c_{t+1}^*$  as a function of the real interest rate  $r$ ,  $\beta$ , and income  $y_t, y_{t+1}$ . Show all calculations, but no explanation necessary.
  - (b) (8 points) Suppose instead Bill's intertemporal utility function is quasi-hyperbolic and given by  $U(c_t, c_{t+1}) = \ln c_t + \delta * \beta \ln c_{t+1}$ , with  $MU_{c_t} = \frac{1}{c_t}$  and  $MU_{c_{t+1}} = \frac{\beta}{c_{t+1}}$ . Find Bill's optimal consumption  $c_t^*, c_{t+1}^*$  as a function of the real interest rate  $r$ ,  $\beta$ , and income  $y_t, y_{t+1}$ . Show all calculations, but no explanation necessary.
  - (c) (8 points) Now suppose we estimate that, for Bill,  $\beta = 0.5$  and  $\delta = 0.5$ . Using your answers for a) and b), how does Bill's optimal consumption differ between the two utility functions?
  - (d) (6 points) Why does your answer in part c) make intuitive sense? Cite specific concepts from class for full credit.