Economics 401, spring 2008
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Midterm

Directions: answer each of the five equally-weighted questions. Provide detailed explanations for your answers; unsupported answers are unlikely to receive points. You may use calculators, books, and notes, but no laptops, cell phones, or other communication devices. You may ask the proctor about specific calculations, but he will not help you with the content of the exam.

Problem 1 Suppose Marwood's (weekly) demand for packs of cigarettes is given by

$$q_{cig} = 10 - 2p_{cig} + p_{cof} + \frac{1}{2}m$$

where p_{cof} is the price of coffee, and m is the part of Marwood's weekly income allocated to cigarettes and coffee.

a. Are cigarettes and coffee complements, substitutes, or neither? How can you tell?

b. If $p_{cof} = \$3$ and $m = 18$, how many cigarette packs does Marwood consume if $p_{cig} = \$5$?

c. What is his price elasticity of demand at this price?

d. Would the amount of money Marwood spends on cigarettes increase or decrease if p_{cig} were increased marginally from \$5?

Problem 2 Danforth has preferences over books (B) and movies (M) represented by utility function $u(B, M) = BM^2$. A book costs \$20, while a movie costs \$10; Danforth's entertainment budget is \$120.

a. On a large, carefully-labeled graph, shade in the set of all points Danforth prefers to consuming 3 books and 6 movies. Explain in words how you know your answer is right.

b. On a separate, carefully-labeled graph, shade in the set of all points which are cheaper than consuming 5 books and 2 movies. Again, explain in words why your answer is right.

c. Solve for Danforth's optimal consumption of books and movies. Support your answer.

Problem 3 Reiner makes movies; to do so, he can use either movie stars (S) or CGI effects (C). Suppose that his production function for movies is given by

$$f(S, C) = (min\{2S, C\})^{\frac{1}{2}}$$

a. On a clearly-labeled graph, draw the set of all combinations of inputs S and C which would yield an output of 4 movies. On the same graph, draw the set of all inputs which would yield an output of 8 movies.

b. Suppose movie stars cost \$20, CGI effects cost \$5, and Reiner has \$160 (all prices in millions of dollars). If Reiner wants to produce 4 movies, what is the cheapest combination of movie stars and CGI effects which will accomplish this?

c. Describe Reiner's cost function, that is the cost of producing q movies, for any q.

d. Reiner can sell rights to his movies to studios for \$100 apiece (again, all prices are in millions of dollars). Given your answer to part c, how many movies should he produce? What will be Reiner's profit from producing this many movies?

Problem 4 Rudiger has preferences over hours of sleep (H) and boxes of No-Doz (N) represented by utility function $u(H, N) = 3H + 8N$.

a. In a clearly-labeled graph, sketch the set of all bundles giving Rudiger a utility of 48. On the same graph, sketch the set of all bundles yielding utility of 96.

b. Suppose a box of No-Doz costs \$30, while an hour of sleep 'costs' \$10 (i.e. Rudiger would be willing to pay \$10 to have a chance to stay up and watch TV). Rudiger has \$120. What is his utility-maximizing combination of sleep and No-Doz?

Problem 5 Chessa has monotonic preferences over pizza and beer; she dislikes all other food and beverages. She has \$2,100 to spend each month on pizza and beer. When the price of a beer is \$5, and the price of a pizza is \$10, Chessa maximizes her utility by purchasing 120 beers and 150 pizzas.

Suppose the price of beer increases to \$6 while, at the same time, the price of pizza decreases to \$9. Does this change make Chessa better or worse off, or is there not enough information to tell?

Use indifference curve/ budget set analysis and/or a detailed explanation to support your answer.