Midterm exam

Instructions: You have 75 minutes to complete this exam. Write your answers in the blue book provided to you. Credit, including partial credit, will depend principally on your explanations, so be sure to write thorough answers. Unsupported answers will receive 0 credit. Good luck!

1. Kordell sells umbrellas downtown when it is raining. As he is the only one who can stand the rain long enough to do this, he is a monopolist. Suppose that Kordell can purchase an umbrella for \$5 from his supplier, and that demand for umbrellas when it's raining is given by $P = 185 - 2Q$.

a. **(5 points)** What price should Kordell charge for an umbrella in order to maximize his profit?He should charge \$95.

b. **(5 points)** Calculate Kordell's profit from his umbrella business.He makes \$4050.

2. Craig's utility over consumption today (C_1) and consumption tomorrow (C_2) is $u(C_1, C_2) = 4C_1^8C_2^2$, so that $MU_{C_1} = 32C_1^7C_2^2$ while $MU_{C_2} = 8C_1^8C_2$. Suppose the price of one unit of consumption today is $p_1 = \$1$, while the price of a unit of consumption tomorrow is $p_2 = \frac{\$1}{1+R}$, where $R = .25$ is the interest rate you can earn if you save money today for tomorrow. Suppose Rex has \$900; he can spend it today on C_1 or save it for tomorrow and spend it on C_2. He will not earn any additional money tomorrow.

a. **(5 points)** Determine how much Rex consumes today and tomorrow.$C_1 = 720$, $C_2 = 225$.

b. **(5 points)** How would Rex's consumption change if the interest rate R were to decrease? Say what would happen to both C_1 and C_2.Increasing R increases the price of C_2. Given this utility function C_1 remains the same and C_2 decreases.

3. Cade is considering purchasing a membership in the Harbuck's "coffee club", which costs \$64/month, but lowers the price of a coffee from \$4 to \$3 for members. He has \$400/month he spends on either coffee (C) or scones (S). The price of a scone is \$2.

a. **(10 points)** On the same graph, draw two budget sets, one in which Cade purchases the membership, and one in which he does not.

b. **(10 points)** Cade's utility function is given by $u(C, S) = \min\{2C, S\}$. Should he purchase the membership? Cade gets utility of 100 as a non-member versus 96 as a member,s o he should not purchase the membership.

c. **(5 points)** Now suppose Harbuck's is considering changing its membership fee. Solve for the fee at which Cade is indifferent between becoming a member and not doing so. \$50.

4. **(10 points)** Rex has an income of \$500. He also gets \$300 in food stamps from the government, which can only be redeemed for food. Food stamps cannot be redeemed for cash, but can be sold on the black market for about \$.60 per dollar of food stamps.

Explain briefly, possibly with the aid of a diagram, why giving Rex \$300 cash instead of food stamps cannot make him worse off, and might make him better off.If, given an income of \$800 in cash, he chooses to spend more than \$300 on food, then he is no worse off by having \$500 cash and \$300 food stamps. However,

if given that income he would prefer to spend less than \$300 on food and more than \$500 on other things, he would be better off receiving cash instead of food stamps.

5. The supply of labor describes the number of workers willing to work at various wages. The demand for labor describes the number of workers that employers want to hire at various wages. Economists who study labor markets find that most workers will work a full work week regardless of the wage they are paid. However, employers significantly reduce the number of workers hired when the wage rises.

a. **(5 points)** Which do we say is more inelastic, supply of labor or demand for labor? Explain briefly.Supply is more inelastic based on the statement contained in the question.

b. **(5 points)** The US charges a tax to employers based on the total wages they pay. Will most of the economic incidence of this tax fall on employers or workers? Explain briefly.The majority of the tax will fall on workers, the inelastic side of the market.

c. **(5 points)** A binding minimum wage generally causes unemployment. Will this unemployment be greater if demand for labor is more elastic or if demand for labor is more inelastic? Illustrate on a diagram.Unemployment is greater the more elastic labor demand is.

6. Doug's Discount Filing Cabinets estimates that the price elasticity of demand for their product is $\epsilon = -.7$. Doug's cost function is $c(Q)$. Doug is considering **decreasing** his price by 10%.

a. **(5 points)** Will Doug's revenue increase or decrease (or is it uncertain)? Explain why.It would decreases, as demand is inelastic.

b. **(5 points)** Will Doug's profit increase or decrease (or is it uncertain)? Explain why.Profit would decrease; revenue decreases and costs increase with the added production.

7. Miranda operates a copy shop. She estimates the price elasticity of demand for her product is $\epsilon = -1.4$. She is considering **increasing** her price by 10%. It costs Miranda $c(Q)$ to make Q copies in a given day.

a. **(5 points)** Will Miranda's revenue increase or decrease (or is it uncertain)? Explain why.It would decrease, as demand is elastic.

b. **(5 points)** Will Miranda's profit increase or decrease (or is it uncertain)? Explain why.This is ambiguous, as while revenue would decrease, so would costs.

8. Erik's utility over xylophones (X) and yarn (Y) is $u(X,Y) = \sqrt{X} + \sqrt{Y}$, so that $MU_X = \frac{1}{2\sqrt{X}}$ and $MU_Y = \frac{1}{2\sqrt{Y}}$. His income is \$$I$.

a. **(5 points)** Solve for Erik's demand for xylophones as a function of his income I, the price of a xylophone p_X and the price of yarn p_Y.$X = \frac{I}{p_X(1+\frac{p_X}{p_Y})}$

b. **(5 points)** Are xylophones and yarn complements or substitutes for Erik?From inspection of the above demand function, they are substitutes.