Midterm
Intermediate Microeconomics
Fall 2014
October 7, 2014

Name: _____

Instructions

1. Answer all questions.

2. The exam will be graded out of 100 points. Points for each section and points for each question are indicated on the exam.

3. Write legibly. Illegible exams cannot be graded.

4. Do your best to fit all your answers on the front side of the exam. If you need to use the back of a page, indicate that clearly.

5. Label all figures as needed.

6. Make sure you **explain** your answers as needed. When appropriate, you should also explain any assumptions that you make to arrive at your answer. Explanations may yield partial credit.

7. Be concise.

8. The final page is intentionally left blank for extra work. If you do extra work on this page (or in any other non-standard location) that you would like to be counted, you must note it clearly near the question you are answering.

9. Put your name on each page.

A. Ripped From the Headlines (14 points)

1 (7). Metro Trains.

Read the article at the end of the test. Pick out three metro investments that the author talks about in the first three columns. For each of these three, describe whether the cost is fixed or variable, and briefly justify your answer. Make sure that of your three costs, at least is fixed and one is variable.

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2 (7). War

The Congressional Budget Office has estimated that the U.S. involvement in Iraq has cost roughly $2 trillion.

Make two arguments in favor of continued U.S. involvement in Iraq. Make an argument (label it "A") that resorts to (falls into the trap of) the "fallacy of sunk costs." Make an argument (label it "B") that does not resort to the fallacy of sunk costs. Label each argument, and make each as brief as possible.

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B. Short Answer Questions (40 points)

1 (5). Name two factors that influence demand, and briefly explain why they influence demand.

2 (5). Why do we usually assume that the marginal product of capital is decreasing?

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3 (5). Name one good that is a normal and that is inferior for you. Use the definitions to explain why each is which to you.

4 (5). Is the cross-price elasticity of (E_D^{XY}) higher (in absolute terms, not in absolute value) if X and Y are substitutes or complements? Assume X and Y are normal goods.

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5 (5). For the two following production functions, determine whether they exhibit constant, decreasing, or increasing returns to scale.

1. $Q = K^{1/3} L^{1/3}$

2. $Q = 6K + 3L$

6 (5). Draw indifference curves such that you are willing to give up a lot of peking duck to get a little bit of pluots. Put the duck on the vertical axis and the pluots on the horizontal axis.

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7 (5). If a 3% increase in income leads to a 1% increase in the quantity purchased, what is the income elasticity of demand? Is the good an inferior good?

8 (5). Draw a budget constraint for apples and pears when income is I and the price of apples is P_a and the price of pears is P_p. Put pears on the horizonal axis. Label the intercepts, showing how you could calculate their values.

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C. Medium Answer Questions (46 points)

1 (16). Traffic Cameras and Market Equilibrium

Suppose that there are two cities, and each has a demand for red-light traffic cameras. City A's demand is $Q_A = 5 - P$. City B's demand is $Q_B = 15 - 2P$. Market supply for red-light traffic cameras is $Q_S = 4P - 1$.

(a) What is total market demand for red-light traffic cameras by the two cities?

(b) What is the equilibrium price for red-light traffic cameras?

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(c) How much producer surplus do the camera manufacturers receive?

(d) Suppose that City B faces a backlash from unhappy voters who feel that they are getting too many tickets, and that the city's demand for red light cameras decreases. Does producer surplus increase, decrease, or stay the same? Explain how you arrive at your answer. Draw diagrams as is helpful.
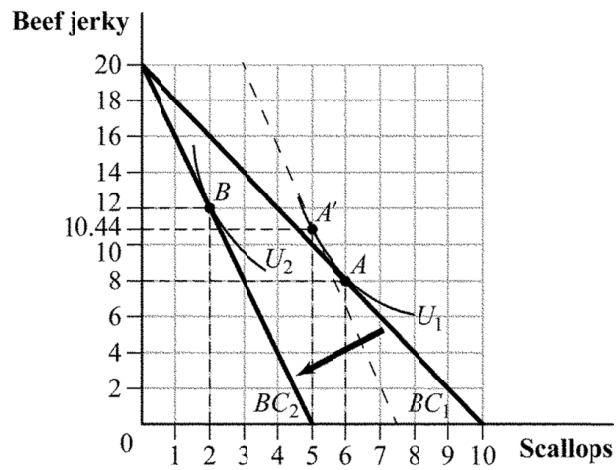
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2 (15). Firm production

Suppose that a firm's production function is given by $Q = KL$, where $MP_K = L$ and $MP_L = K$. Here Q is quantity of output, K is units of capital, and L is units of labor. The price per unit of labor and capital are \$30 and \$20, respectively.

(a) How many units of labor and capital should the firm use if it wants to minimize the cost of producing 600 units of output?

(b) Suppose that the firm experiences a technological change, transforming its production function to $Q = 1.23KL$ ($MP_K = L$ and $MP_L = K$). What is the minimum cost of producing 600 units of output?

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(c) Characterize the firm's production function. Is there any complementarity between K and L? Why or why not?

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3 (15). Income and substitution effects

(a) What is the size of the income effect and substitution effect of the price change for scallops and for beef jerky?

(b) Are scallops a normal good or an inferior good?

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(c) Is beef jerky a normal good or an inferior good?

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Metro boss's legacy: Big accomplishments and lingering problems

Dr. Gridlock

ROBERT THOMSON

Metro General Manager Richard Sarles took the stage Tuesday afternoon for his last appearance before the business and civic leaders who attend the annual "all you need to know" session on regional transportation sponsored by the Northern Virginia Transportation Alliance.

NVTA President Bob Chase makes the speakers tell their stories in five minutes — and there's a timer, so the officials involved tend to focus on highlights.

For Sarles, who plans to retire in January, that means three things: Ensuring the safety of the transit system, bringing Metro back to a "state of good repair" and getting it on course to achieve long-term goals, including having all trains at rush hours.

Five minutes isn't time for more than highlights, but Sarles could have noted that Metro this fall is beginning a long process of restoring automatic train op-

erations. That computer-driven system is the way the trains were built to run, but they've been operated manually since the deadly Red Line crash in 2009.

Restoring automatic train operation is a sign to riders that Metro is solving the most complex rail safety problem identified by crash investigators.

Sarles got to this session, held at the Capital One headquarters, by riding the Silver Line to the new McLean station. The Silver Line opened successfully on his watch this summer, about half a year ahead of the time when Metro's new rail cars will enter service.

Sarles said he hopes to ride on one of those new trains before he leaves. He's also hoping, as he stressed to the audience of several hundred, that the region's governments will agree to finance another round of rail car purchases by next summer.

Buying more cars is part of Metro's campaign to expand the rail system's capacity, but so is adding more traction power to run longer trains and building rail yards that can hold them all, Sarles said.

Doing what it takes to lengthen all the trains at rush hours is Metro's most important initiative to ease congestion. Going to all eight-car trains means a big increase in capacity for a relatively modest investment — modest compared with the cost of building new stations, new Potomac River crossings and new tunnels.

Turning his appeal to this business-oriented audience, Sarles said that "the region will suffer competitively without eight-car trains." But he also wanted them to know that the investments they already had supported to rebuild the transit system were showing results for Metro's customers.

This is where we enter the other part of the Metro world, the one populated by the tens of thousands who are just trying to get to work. For many Red Line riders on this particular Tuesday, Metro's results did not include getting them to their destinations on time.

At 7:44 a.m., as the rush hour was building toward its peak, Metro discovered that a rail in the tunnel outside the Dupont Circle station had cracked.

Therefore, trains heading in both directions had to take turns using the one open track between the Van Ness station and Dupont Circle.

While crews worked on a temporary fix to the rail problem, trains continued the track-sharing until about 10:15 a.m. Metro said passengers were delayed up to 45 minutes. But many riders said their personal pain lasted well over an hour.

It isn't just that train trips take longer in these situations. When rush-hour trains are thrown off schedule, crowds build rapidly on platforms. When packed trains reach full platforms, waiting riders have no choice but to watch the doors close and await developments. Both sides of Tuesday have to be part of the Sarles legacy.

There was the afternoon part, where an auditorium full of business and community leaders applauded his tenure and approved of Chase's statement that his departure will be "a great loss for our region."

And there was the morning part, when platforms full of morning commuters cursed the transit system and wondered

what they were going to tell their bosses when they finally got to work.

Sarles will be long gone before we know whether one group or another had a better take on what happened while he was here. It's likely that both the influential and the ordinary people have part of the answer.

At the end of a long career in transportation, Sarles agreed to take on a mighty challenge, rebuilding a deteriorating transit system and restoring public confidence in it. He implemented the strategy to achieve those goals. So he owns both parts of Tuesday, the afternoon's applause and the morning's curses.

Now we're all along for the ride into the future, whether it's a comfortable one aboard a new eight-car train or a long, crowded slog around a rail that failed.

Dr. Gridlock also appears Thursday in Local Living. Comments and questions are welcome and may be used in a column, along with the writer's name and home community. Write Dr. Gridlock at The Washington Post, 1150 15th St. NW, Washington, D.C. 20071, or e-mail drgridlock@washpost.com.

Blank – for extra work

Name: _____