ECON 110, Professor Hogendorn, Spring 2019

First Midterm Exam Section 3

By handing in this exam, you acknowledge under the Wesleyan Honor Code that you have not discussed it with anyone who took it yesterday, or that if you have, then you have written in your exam book what you learned and how it influenced your answers and accept that this may result in a reduced grade.

Each part of a question (a, b, c, etc.) is worth 5 points. Make sure to allot your time accordingly. Total of 25 points, -1 for messiness.

When you are finished, please keep or recycle the exam sheet and hand in your blue book.

1. *Toys.* The toy industry has experienced a change in the number of firms, with corresponding changes in the toy prices, quantities of toys sold, and toy seller profits. Let market demand for toys be $Q_D = 100 - 10p$ and let the toy industry be perfectly competitive.

    (a) Suppose a typical toy company has total cost function $TC(q) = 0.25q^2 + 20$. What is the marginal cost and average cost? What is the firm's supply curve? Illustrate on a graph. If there are 5 such firms, what is the market price of toys? What are the net profits of an individual firm, both numerically and as a rectangle on your graph?

    (b) If neither the demand nor the total cost function changes, what will be the long run equilibrium number of firms, price of toys, and quantity of toys produced by an individual firm?

2. *UncleKarlPart1.* Your Uncle Karl gives you 20 million dollars. He won't be giving you more however, so your endowment is income

of M_t = \$20 this year and income next year of M_f = 0. You have the option to buy a diversified portfolio of stocks and bonds that receives a yearly rate of return of 6%.

Draw a graph of money today versus money next year along with a budget line based on the 6% real interest rate. Show on your diagram the present value of your endowment and the maximum future value of your endowment assuming you put it all into the diversified portfolio. Also show the consumption point $C_t = 10, C_f = 8$, and position it correctly with respect to the buget line. Do you think this is a utility-maximizing point to pick for your consumption today and consumption next year? Explain.

3. *UncleKarlPart2*. Your Uncle Karl has given you 20 million dollars which you now have deposited in a checking account. You are thinking about starting an Internet business venture that depends on people watching your videos.

   (a) No labor is involved in this business; the only factor is capital. Your production function is $f(K) = 4000K^{3/5}$ where output is measured in the number of videos. Your cost of capital, calculated by a reputable investment banker, is $r = 0.15$. If the price of each video is \$0.04, how much capital should you invest in this business? Do you earn a competitive rate of return on your capital, or do you receive rents?

   (b) Your friend, who just goes by "Amherst Guy," calculates that you end up earning about 25% on your capital, based on your total revenue divided by your total amount of capital invested. He therefore recommends that you use $r = 0.25$ as your cost of capital instead of $r = 0.15$. Why is this bad advice? If you took the advice, what would end up happening (just say in words what direction things would go, you don't have to do the calculations).