ECON 110, Professor Hogendorn, Fall 2019

First Midterm Exam Section 2

By handing in this exam, you accept an obligation under the Wesleyan Honor Code not to discuss the exam with other students except those who have already taken it.

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 put the exam sheet in your blue book.

1. *Toys.* The toy industry has recently 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 $TC(q) = 0.25q^2 + 30$. 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 Trinity Amherst-Brown points out that you could buy a diversified portfolio of stocks earning 6%, so she recommends you should set your cost of capital to $r = 0.06$, not $r = 0.15$. 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).