Homework 4

ECON 380
UNC Chapel Hill

Name: _____

ONYEN: _____

This homework is due on **March 8** by **12:05PM**. You must turn in your work on a printed copy of this document in order for it to be graded. Your assignment must be stapled and in the correct order. Non-stapled assignments will automatically receive a 10 point deduction. There are a total of 50 available points.

Present Value

1. Suppose Mallory lives for two periods, $t = 1, 2$. In period 1, she could either directly enter the labor force and earn \$30,000, or she could enroll in college where her costs would be \$45,000. In period 2, Mallory will either earn \$30,000 if she chose to enter the workforce in period 1, or \$120,000 if she went to college in the first period. All transactions occur at the beginning of each period.

   (a) What is the net present value of Mallory's earnings if she decides to directly enter the labor force in period 1 and her discount rate is 5%? **[2 pts]**

   (b) What is the net present value of Mallory's earnings if she decides to go to college in period 1 and her discount rate is 5%? **[2 pts]**

   (c) At a discount rate of 5%, what path (college vs. non-college) maximizes Mallory's present value of lifetime earnings? **[2 pts]**

(d) At a discount rate of 25%, what path (college vs. non-college) maximizes Mallory's present value of lifetime earnings? **[4 pts]**

(e) At what discount rate would Mallory be indifferent between directly entering the labor force and going to college? Call this rate r_{id}. **[4 pts]**

(f) How does Mallory's optimal decision change depending on the relationship between her discount rate r and r_{id}? That is, what is Mallory's choice if $r < r_{id}$? What if $r > r_{id}$? **[4 pts]**

Schooling Model and Ability Bias

1. Consider the wage-schooling locus described in Table 1.

Table 1: Cyril and Pam's Wage-Schooling Locus

Years of Schooling	Earnings	MRR
11	\$20,000	—
12	\$25,000	
13	\$29,000	
14	\$32,500	
15	\$34,500	
16	\$36,000	
17	\$37,000	

(a) Fill in the marginal rate of return to schooling for years 12 - 17. **[3 pts]**

(b) Suppose Cyril follows this wage-schooling locus. His discount rate is $r_C = 9\%$. What is his optimal level of schooling? **[2 pts]**

(c) Suppose Pam follows this wage-schooling locus. Her discount rate is $r_P = 15\%$. What is her optimal level of schooling? **[2 pts]**

Suppose Archer has the same discount rate as Cyril, $r_A = 9\%$. However, Archer has a higher ability level than Cyril, $A^A > A^C$ and his wage-schooling locus is shown in Table 2.

Table 2: Archer's Wage-Schooling Locus

Years of Schooling	Earnings	MRR
11	\$22,000	—
12	\$32,000	
13	\$40,000	
14	\$47,000	
15	\$53,000	
16	\$58,000	
17	\$62,000	

(d) Fill in Archer's marginal rate of return to schooling for years 12 - 17. **[3 pts]**

(e) What is Archer's optimal schooling level? **[2 pts]**

(f) Suppose we don't account for the differing wage-schooling loci of these individuals and estimate the marginal rate of return by comparing Cyril's wage/schooling outcome to Archer's wage/schooling outcome. What is the estimated MRR? **[4 pts]**

(g) Compare your naive estimate of the marginal rate of return from part (f) to the true marginal rate of return to the 15^{th} year of education for Cyril and Archer. Is our estimate higher than the true marginal rate of return, or lower than the true marginal rate of return for the 15^{th} year of education for these individuals? **[4 pts]**

Signaling Model

1. Suppose there are two types of persons: high and low-ability. A particular diploma costs a high-ability person \$15,000 and costs a low-ability person \$25,000. Firms wish to use education as a screening device where they intend to pay \$40,000 to workers without a diploma and \$$K$ to those with a diploma. In what range must K be to make this an effective screening device? **[4 pts]**

Human Capital and Development

Directions: Type your answers to the following questions and attach them to the back of this packet.

1. Read Borjas 6.6 and the introduction to Duflo (2001). In 4-6 sentences, briefly summarize (i) the policy experiment analyzed in the paper and (ii) the results regarding how the policy affected schooling and labor market outcomes. What is estimated range of the rate of return to schooling? **[4 pts]**

2. Read the introduction to Jensen (2010) and answer the following questions.
   (a) Jensen argues that the perceived rate of return to education is likely different than the actual rate of return to education, especially in developing countries. In 3-4 sentences, describe two of the factors he provides that might drive this difference and explain which rate of return (perceived versus actual) is likely smaller in low-income nations. **[2 pts]**
   (b) In 4-6 sentences, briefly describe (i) the intervention analyzed in the paper and (ii) the results of the intervention. Is the estimated effect of the intervention the same for students across income groups? **[2 pts]**