Extra Credit Homework Assignment #2

Is College Worth It?

Key Formulas

Formula Name	Formula	Variable Definitions
Compounding Interest	$P \times (1 + R/100)^Y = B$	P: Principle R: Interest Rate Y: # of Years invested B: Balance after Y years
Income from Interest	$\dfrac{P \times R}{100} = I$	P: Principle R: Interest Rate I: Income
Present Discounted Value	$PDV = \dfrac{V}{(1 + R/100)^Y}$	PDV: Present discounted value V: Value in Y years R: Interest Rate Y: # of Years
Savings with Interest and Yearly Contributions	$\dfrac{C}{R/100} \times \left[(1 + R/100)^{Y+1} - 1 \right] = B$	C: Yearly Contribution R: Interest Rate Y: # of Years Invested B: Balance after Y years
Present Discounted Value with yearly costs or benefits	$PDV = \dfrac{B}{(1 + R/100)^Y}$	PDV: Present discounted value B: Balance computed from the "Savings with Interest and Yearly Contributions" equation R: Interest Rate Y: # of Years

We will be replicating the exercise we did in class for out of state students.

1. Computing the present discounted value of the tuition, room and board, books, and personal expenses for college.

   a. Iowa State estimates the cost of tuition, room and board, books, and personal expenses for college, for a non-resident student, is $31,470 per year. We will assume these costs do not go up, to make the calculations easier. As in class, assume the interest rate is 3.5%. Complete the following table, like we did in class:

Year	Carried Over	Additional	Total
0	0	$31,470	
1		$31,470/1.035 =	
2		$31,470/1.035^2 =	
3		$31,470/1.035^3 =	

b. Indicate on your table what the present discounted value of college tuition, room and board, books and personal expenses for college are.

c. Show how you can use the formula for *Present Discounted Value with yearly costs or benefits* to obtain the same answer.

2. Factoring in opportunity costs
   a. In 2013, the median person without any college earned $32,550 per year (if they worked 50 hours a week). Assume again that the interest rate is 3.5%. Compute the present discounted value of the opportunity cost of going to college, using either the table method from Part A of Question 1, or the formula for *Present Discounted Value with yearly costs or benefits*. Your final answer should be the same as we obtained in class. Show your work.

   b. What is the total opportunity cost of going to college for an out-of-state student?

3. In class, we showed the present discounted value of the benefits from going to college was $459,234.75, if you graduate when you are 22 and work until the age of 65. Is it worth going to college if you have to come from out-of-state? Why?

4. The median college graduate earned $55,400 per year after graduating, if they work 50 weeks per year. What is the present discounted value of the benefits from going to college if you graduate when you are 23 instead of 22? Assume you work until age 65, and are 18 when you start college. Continue to assume a 3.5% interest rate.

5. Out-of-state students can establish residency (meaning they would pay *in-state* tuition) in Iowa by working as an independent here for one year. Suppose a student can earn the non-college wage of $32,550 if the forgo college for one year.
   a. What is the benefit of establishing residency, in terms of reducing the cost of college? Explain intuitively and with a precise number.

   b. What is the cost of establishing residency, in terms of reducing the value of wage earnings? Explain intuitively and with a precise number.

   c. Is it worth establishing residency? Note: In the real world, there are a number of other factors to consider, such as the impact on parental dependence, the likelihood of finding a job paying the median salary if you will only be staying for a year and you are out of state, etc. Ignore these for the purposes of the homework.

6. Now we'll calculate how long an out-of-state student should stay in school, like in class. Assume we continue to discount at 3.5%.

Degree	Annual Tuition Costs	Time to Complete	Yearly Salary If Complete
High School	0	0	$32,550
Some college	$31,470	2	$38,850
College Degree	$31,470	2	$55,400
Master's Degree	$33,380	2	$66,450
Doctorate	$33,380	5	$81,150

Assuming you start school at age 18 and will work until you are 65, fill out the following table, as in class:

Degree	Marginal Benefit	Marginal Cost	Marginal Value
High School	0	0	0
Some College			
College Degree			
Master's Degree			
Doctorate			

How long should the student stay in school?