

In-Class Problems — Week 7, Wed

Problem 1. Suppose you were about to enter college today and a college loan officer offered you the following deal: \$25,000 at the start of each year for four years to pay for your college tuition and an option of choosing one of the following repayment plans:

Plan A: Wait four years, then repay \$20,000 at the start of each year for the next ten years.

Plan B: Wait five years, then repay \$30,000 at the start of each year for the next five years.

Suppose the annual interest rate paid by banks is 7% and does not change in the future.

(a) Assuming that it's no hardship for you to meet the terms of either payback plan, which one is a better deal? (You will need a calculator.)

(b) What is the loan officer's effective profit (in today's dollars) on the loan?

Problem 2. We begin with two large glasses. The first glass contains a pint of water, and the second contains a pint of wine. We pour $1/3$ of a pint from the first glass into the second, stir up the wine/water mixture in the second glass, and then pour $1/3$ of a pint of the mix back into the first glass and repeat this pouring back-and-forth process a total of n times.

(a) Describe a closed form formula for the amount of wine in the first glass after n back-and-forth pourings.

(b) What is the limit of the amount of wine in each glass as n approaches infinity?

Problem 3. Using the method described in lecture, a truck can travel across any size desert if there is a large enough supply of gas at the border of the desert. Show that if there is a large enough supply of gas at the border, a truck can also make a *round trip* across any size desert.