

Midterm 1

1. (21 points) For all the parts to this problem, let the annual discount rate be 5%.
 - a) Find the present value of the following cashflow: receive \$10 every year for 30 years with the first payment being 10 years from now.
 - b) Find the present value of the following cashflow: receive \$10m now and the same amount in a year from today, and pay \$3m a year forever with the first payment being a year from today.
 - c) Consider the following two cashflows. For cashflow A, you receive \$10 every year for 5 years with the first payment being today. For cashflow B, you receive x dollars every year forever with the first payment being today. What is the value of x in order for cashflow B to have the same present value as cashflow A?
2. (15 points) Today, you're in charge of the nation's finances. Suppose that projected 2015 shortfall is \$418 billion and projected 2030 shortfall is \$1,345 billion. In present value terms, how large is the difference of the two budget shortfalls? Assume a 3% discount rate.
3. (18 points) Suppose that you borrowed \$20k for 36 months to buy a car last year at an annual interest rate of 5% compounded monthly.
 - a) What is the amount of monthly payment?
 - b) Calculate the effective annual interest rate for both the car loan and for a rate of 6% compounded quarterly. Which is larger?
 - c) You made monthly payments for the last 12 months. But you still have to make 24 more payments. What is the present value of the remaining payments?
4. (15 points) Suppose that you consider some mortgage options. The price of home is \$200k. Calculate your monthly payments for each option:
 - Option A: 20% down payment at 15-year fixed annual rate of 4%
 - Option B: 15% down payment at 30-year fixed annual rate of 4.5%
 - Option C: 10% down payment at 30-year fixed annual rate of 6%
5. (15 points) Suppose that an account has \$6m now. The money is invested and obtains a return of 2%. Your business projections are that in year one you take out \$2m, in year two you take out \$0.7m, in year three you add \$1m to the account, and in year four you add \$4m to the account. Calculate the amount of money in the account a year from now, two years from now, three years from now, and four years from now.
6. (16 points) Consider a 30-year mortgage with a 5% interest rate and a 20% down payment. If you can afford a \$1000 monthly payment, how expensive a house can you buy?