

# Business Calculus, Summer 2004

## Homework #1

Due: Tuesday, July 6th 2004 by end of class

1. Suppose we deposit \$150 into a bank account. How many years will it take for the value of the account to double under each of the following interest schemes:
  - (a) 8.5% compounded annually
  - (b) 7.5% compounded semi-annually
  - (c) 7% compounded monthly
  - (d) 6.75% compounded continuously

Does the amount of money originally deposited into the account affect the doubling time?

2. First determine how much \$1000 compounded annually at 9% will grow to in 12 years. Once you've done this, determine the rate of interest that would be necessary to grow the same \$1000 to the same final amount in the same 12 years, but assuming the money is compounded continuously instead of just annually.
3. A corporate bond has a redemption value of \$100,000, but does not come due until after 20 years. Also, at the end of every second year, starting with the end of year 2 and ending at the end of year 20, the bond makes coupon payments of \$5000. Assuming that the market rate for money is 4.5% compounded annually, what is the value of the bond right now?
4. A young couple decides to take out a 30-year mortgage on a home they want to buy for \$225,000. The lending company requires that the couple makes a 5% down payment, and the company will lend them the rest. They charge 3% interest, compounded monthly. What will the couple's monthly mortgage payment have to be?
5.
  - (a) Suppose that on a girl's 10<sup>th</sup> birthday her parents decide to open a college savings fund by depositing  $A$  dollars into an account. They deposit the same  $A$  dollars on every birthday up to and including her 18<sup>th</sup>, at which time they want the value of the fund to be \$75,000. If the money in the account compounds continuously at 7%, determine  $A$ . Once you've done this, figure out what percentage of the \$75,000 was deposited by the parents, and what percent comes from the interest.
  - (b) Do part (a) again, including the percentage calculations, but assume the parents begin depositing money on the girl's 4<sup>th</sup> birthday.