

MATH 2600/STAT 2600, Theory of Interest
FALL 2010
Toby Kenney
Midterm Examination
Thursday 4th November, 11:30 – 13:00

Scientific calculators permitted; programable calculators must have memory wiped; financial calculators not permitted.

1. An investor has a promissory note for \$3,000 in 150 days at 5% simple interest. After 40 days, she sells it to a bank which discounts notes at 4.8%
 - (a) How much does the bank pay for the note?
 - (b) What rate of return does the original investor achieve?
2. Which of the following rates of interest is best for the investor if the investor is planning to withdraw the investment after 6 months, and the practical method is used for partial interest periods?
 - (i) 7% compounded monthly
 - (ii) 7.1% compounded quarterly
 - (iii) 7.25% compounded annually
3. A man takes out a loan for \$40,000 at $j_{12} = 3\%$. He plans to repay it with 3 equal payments: one after 6 months, one after 1 year, and the final payment after 3 years. What will these payments be?
4. Fred takes out a 20 year mortgage for \$150,000 at $j_2 = 6\%$. This results in monthly payments of \$1,081.56, and a final payment of \$1,081.31. After 5 years, the mortgage is refinanced at $j_2 = 5\%$ for the remaining 15 years. The new monthly payments are \$995.30, with a final payment of \$994.83. Calculate the outstanding balance 3 years later, i.e. 8 years from the start of the mortgage.
5. Mrs. Williams invests \$200 every month into an investment fund. At the end of 8 years, the value of the fund is \$24,945.69. What is the annual effective rate of return?
6. Mr. Smith donates \$50,000 to his old university. He intends for the donation to be used to set up an annual prize to be awarded at the end of the year. He wishes the first prize to be \$3,000 and would like the prizes to increase by 3% each year. If the money can be invested at $j_1 = 7\%$, how long can prizes be awarded from this fund?
7. Mrs. McNeil wants to borrow \$400,000 to set up her business. She has 2 options for repaying it over 5 years:

- (i) borrow at $j_{12} = 10\%$ and amortise the debt with monthly payments.
- (ii) borrow at $j_{12} = 9\%$, repay the interest every month and set up a sinking fund which earns $j_{12} = 6\%$ to repay the principal.
- Which option is better (leads to lower monthly payments):