

Hand-in Homework 2

Chapter 1: The measurement of interest Chapter 2: Solution of problems in interest

To receive full credit, show all work necessary to justify answers and all steps of proofs and derivations clearly, in logical sequence, using notation developed in class. Reference formulas and theorems from the book explicitly where needed. Write proofs in complete sentences (with proper capitalization, punctuation, subject, verb, etc.). Partial credit will be given only for significant progress toward a solution.

1. Suppose $a(t) = \alpha t^2 + \beta t + \gamma$. If \$100 invested at time 0 accumulates to \$152 at time 4 and \$200 invested at time 0 accumulates to \$240 at time 2, find the accumulated value at time 8 of \$5000 invested at time 6.

2. (a) At a particular rate of simple interest, \$1400 invested at time $t = 0$ accumulates to \$1820 at time T years. Find the accumulated value at time $2T$ years of \$500 invested at time $t = 0$ at the same rate of simple interest.
 (b) At a particular rate of compound interest, \$1400 invested at time $t = 0$ accumulates to \$1820 at time T years. Find the accumulated value at time $2T$ years of \$500 invested at time $t = 0$ at the same rate of compound interest.

3. (a) Find the nominal rate of discount convertible monthly that is equivalent to a nominal rate of interest of 7% per annum converted semiannually.
 (b) Express $i^{(6)}$ in terms of $d^{(4)}$.

4. Find n given that

$$1 - \frac{d^{(n)}}{n} = \frac{1 + \frac{i^{(7)}}{7}}{1 + \frac{i^{(6)}}{6}}.$$

5. Maude deposits \$500 into a bank account. Her account is credited interest at a nominal rate of interest of 10% convertible quarterly. At the same time, Jeffrey deposits \$500 into a separate account. His account is credited interest at a constant force of interest of δ .
 (a) Find δ if the value of Maude's account is the same as the value of Jeffrey's account after 3.5 years.
 (b) Find δ if the value of Maude's account is the same as the value of Jeffrey's account after 10.7 years.

6. Fund A grows under simple interest with rate i . That is, $a(t) = 1 + it$ is the accumulation function. Fund B grows under simple discount with rate d . That is, $b(t) = \frac{1}{1 - dt}$ is the accumulation function. Suppose $i > d$. Derive an expression for the time t at which the force of interest in the two is the same.