FORMULAS
You may detach this page from the exam and use it for reference.

Compound Interest

$$F = P\left(1+i\right)^m$$

Future Accumulation of a Periodic Payment

$$F = A\frac{\left(1+i\right)^m - 1}{i} \qquad A = \frac{Fi}{\left(1+i\right)^m - 1} \qquad m = \frac{\log\left(1 + \frac{Fi}{A}\right)}{\log(1+i)}$$

Present Value of a Sequence of Payments

$$P = A\frac{1-\left(1+i\right)^{-m}}{i} \qquad A = \frac{Pi}{1-\left(1+i\right)^{-m}} \qquad m = \frac{-\log\left(1 - \frac{Pi}{A}\right)}{\log(1+i)}$$

Balance Midway Through a Sequence of Payments

$$P_{m_0} = A \times \frac{1-\left(1+i\right)^{-(m-m_0)}}{i} = P \times \frac{1-\left(1+i\right)^{m_0-m}}{1-\left(1+i\right)^{-m}}$$

This exam is *open-notes* and *open-book*. A calculator is permitted. Please show all work. If you need to continue an answer on another page or on the back of a page, please make that clear so that it can be followed by the grader.

1. **(24 points)** You are putting \$1200 per quarter into a savings account with an annual interest rate of 1.8% compounding quarterly.

    (a) How much money will you have in your savings account after 5 years of this process?

    (b) How much have you earned in interest over these five years?

    (c) How long will it take you to save \$100,000 in this way?

For TA Use Only	
1	/ 24
2	/ 16
3	/ 13
4	/ 12
5	/ 35
6	/ (5)
Σ	/100

2. **(16 points)** An account with a current balance of $1000 is earning 1.8% annual interest compounding monthly. You want to have $2000 in this account after a full year. How much should you deposit each month to achieve this goal?

3. **(13 points)** I wish to take out an six-year car loan and have been offered an annual rate of 3.6% compounding monthly. I can afford a $350 monthly payment.

   (a) How much could I borrow on these terms?

   (b) How much *interest* would I pay back over the life of the loan?

4. **(12 points)** Jane has borrowed $3000 to be repaid in a year and a half with three semi-annual payments. The loan earns an annual interest rate of 8.5% compounding semiannually. Her **first two** payments will be for $1086.18 each. Using this information, complete the amortization table below for her loan.

Period	Balance in	Payment	Interest	Principal paydown	Balance out
1					
2					
3					

5. **(35 points)** You are buying a $90,000 house, paying 25% of the price as a down payment and taking out a 15-year mortgage with 3.25% annual interest with no points.

   (a) What is your monthly payment? Make certain to calculate the correct loan principal first.

   (b) What would the finance charge (total interest over the lifetime of the loan) be on this mortgage?

   (c) What is the balance on the loan five years later, when you still have 10 years of payment left on the loan?

   (d) How long (include appropriate units) will it take to pay off the loan if, from the very beginning, instead of the payment calculated in part (a), you pay $750 per month?