

FORMULAS

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

Simple Interest

$$I = Prt \qquad F = P + Prt$$

Annual Compound Interest

$$F = P(1 + r)^t \qquad r = \left(\frac{F}{P}\right)^{1/t} - 1 \qquad t = \frac{\log \frac{F}{P}}{\log(1 + r)}$$

Multiple Compounding Periods

$$F = P \left(1 + \frac{r}{n}\right)^{nt} \qquad r = n \left[\left(\frac{F}{P}\right)^{1/nt} - 1 \right] \qquad t = \frac{\log \frac{F}{P}}{n \log \left(1 + \frac{r}{n}\right)}$$
$$APY = \left(1 + \frac{r}{n}\right)^n - 1$$

This exam is *closed-notes* and *closed-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. **(16 points)** How much would you need to invest today at 3% annual interest, compounded monthly, in order to accumulate \$10,000 over the next six years?

2. **(20 points)** You have invested \$2,000 in an account which pays an annual interest rate of 3.4% compounding quarterly.

(a) What is the minimum number of quarters that this principal must be invested to be worth at least \$3,200?

(b) At the end of this full number of quarters, what is the actual value of your investment?

FOR TA USE ONLY	
1	/ 16
2	/ 20
3	/ 20
4	/ 16
5	/ 12
6	/ 16
Σ	/100

3. **(20 points)** A man borrows \$2000 and pays off the loan three years later by paying the lender back \$2400. Find the annual interest rate associated with the loan, expressed as a percentage and rounded to the nearest hundredth of a percent, in each of the following cases:

(a) The loan earns *simple interest*.

(b) The loan earns *annually compounding interest*.

4. **(16 points)** A “penalty rate” loan charges 5.1% interest compounded monthly for the first year and 12.3% compounded semiannually thereafter. What would you owe if you borrowed \$1100 on this loan and neglected to pay it for five and a half years?

5. **(12 points)** Sleet Bank's savings account returns 6.2% annual interest, compounded semiannually, while an account with the Haberdasher's Credit Union returns 6.1% compounded monthly. Which of these two accounts has a higher return on investment?

6. **(16 points)** If you invest \$3,500 in your bank at a 4.5% annual interest rate, what will be the value of the account in 3 years if the bank provides:

(a) Simple interest?

(b) Compound interest, compounded quarterly?