

PLEASE READ THE GENERAL INSTRUCTIONS ON THE SHEET CONTAINING THE INTEREST TABLES.

Your name (PRINT): _____ Your T-Square UserID _____

Honor Code Certification: _____ (example: gburdell3, NOT 900123456)

I certify that I have abided by the rules of the Georgia Tech honor code for student conduct on exams and by the specific rules on reference materials for this exam, and that I have neither given nor received assistance during this examination. I certify that I have read this statement and understand it.

Circle your regular class time: Mon5 Wed9 Wed4 Wed5 Signature: _____

1. [40] You wish to plan for the nursing home expenses of your parents. You have determined that they will need such care starting ten years after today (with the first payment 10 years from today), and you will plan for fifteen years of care in a nursing home. The current annual expenses, payable annually, in a typical home for two people in the same room are \$85,000 per year. You wish to set aside a single amount of money today, invest it at 10% annual interest, and let that sum pay for the nursing home care.

a. [20] What single amount of money must you invest now to cover the nursing home expenses?

Avoid using long methods (methods that treat each cash flow element separately).

274,187

b. [15] If inflation is expected to be 4% per year for the foreseeable future, and the annual interest on your investment account does not change from the amount stated in part a, what amount of money must you set aside now to cover the nursing home expenses? Write a mathematical expression that would give the answer. Use only basic operators like add, subtract, multiply, divide, and power function. Avoid summation signs and integrals. You may use long methods here. You may leave out the middle elements of a series: for example, instead of the series $\{1 + 2 + 3 + 4 + 5\}$ you may write $\{1 + 2 + \dots + 5\}$. You do not need to evaluate the mathematical expression.

$$b. \quad P = 85000 \left[\frac{(1.04)^{10}}{(1.1)^{10}} + \frac{(1.04)^{11}}{(1.1)^{11}} + \frac{(1.04)^{12}}{(1.1)^{12}} + \dots + \frac{(1.04)^{24}}{(1.1)^{24}} \right]$$

c. [5] If the annual interest (stated in part a) on your investment account is for a zero-inflation economy, the inflation forecast is as stated in part b, and your account is managed by a well-trained professional who knows the business, would the amount you need to set aside now to cover nursing home expenses be closer to the result of part a or part b?

Closer to part a result _____ Closer to part b result _____ Not close to either one _____

Explain in 20 words or less.

Closer to part a

2. [40] You wish to determine if it is worth buying a time-share in a condominium development in a resort area. The time-share plan allows you to occupy the unit for six (6) weeks each year. You would make a **down payment** at the beginning of the planning period, and then an **annual payment** (end-of-year) for the duration of the planning period; the annual payment includes utilities and association fees, taxes, etc. The alternative is to **rent** a condominium or hotel suite in the same resort area, at a **daily rate** (includes taxes). Assume that you would not have any problem selecting the occupancy dates of your unit, and that the daily rate applies to a unit with similar space/quality.
- a. [20] Assume **MARR = 0%**, and **ignore any resale value** of the time-share unit. What is the breakeven number of days/year to rent a condominium or hotel suite compared to the time-share plan? Use the data shown in the table. Express your answer as a decimal (two digits after the decimal point).

Breakeven number of days/year: (two digits after the decimal)	26.67
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- b. [15] Use the **MARR in the table**, but **ignore any resale value** of the time-share unit?

Breakeven number of days/year: (two digits after the decimal)	31.74
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- c. [5] Use the MARR in the table and the estimated resale value.

Breakeven number of days/year: (two digits after the decimal)	26.13
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Table with data values		MARR 10%		
Planning period, years	Down payment for time-share unit	Annual payment for time share unit	Estimated resale value of time-share unit	Daily rate for condo or hotel
12	20 000	5 000	30 000	250

3. [20] As the employer of a company you face a choice of buying a company car for your employee to use, or reimbursing him/her on a mileage basis for use of his/her personal car. Consider the choice of buying and operating a company car. The purchase cost would be \$32,000, it would be used for 48 months (4 years), and then resold for \$8,000. Annual costs for insurance and license fee would \$2500/year; this is payable at the **beginning** of each year. Maintenance costs (oil, tires, batteries, brake pads, etc.) are \$800/year; these are spread **throughout** the year. In addition, fuel cost is \$4.00/gallon, and the vehicle would get 25 miles/gallon. The alternative is to reimburse the employee at the rate of \$0.52/mile for the use of his/her personal car (the employee would be responsible for all vehicle costs, including fuel). With MARR = 0%, what is the **breakeven number of miles per month** that would make the employer indifferent between buying and operating a company car and reimbursing the employee for use of his/her personal car?

2153 miles/month

4. [10] Extra credit: Solve Problem 3 but use a monthly interest rate of 1%. [Use extra paper if you need to.]

2780 miles/month