First Exam MAT 118, Spring 2003

PRINT your Name:

problem	1	2	3	4	5	6	Total
possible	75	20	20	20	20	20	175
score							

Directions: There are 6 problems on 6 pages in this exam (printed on both sides). Do all of your work in this exam booklet, and cross out any work that should be ignored. You may not use any books, extra papers, or discussions with friends during this exam. You are welcome to use a calculator.

If you have a time machine, you are welcome to move ahead a few days, check the correct answers on the web page, and then write them here. But you have to let me borrow your machine.

Some information you might or might not find useful is listed below.

Thomas Jefferson was elected president in 1800.

Simple interest formula: $F = P(1 + rt)$

Compound interest formula: $F = P\left(1 + \frac{r}{n}\right)^T$

Annual Percentage Yield: $APY = \left(1 + \frac{r}{n}\right)^n - 1$

Systematic Savings: $F = R\left(\frac{\left(1 + \frac{r}{n}\right)^T - 1}{\frac{r}{n}}\right)$

Amortized Loans: $P = R\left(\frac{1 - \left(1 + \frac{r}{n}\right)^{-T}}{\frac{r}{n}}\right)$

There are 365 days in a year, 12 months in a year, 4 months in a quarter, and a dime is worth 10 cents.

You can use this page for extra work, or to draw a pretty picture if you are bored.

1.*(75 points)* The seven members of a spelunking club want to choose one member to go first in exploring a dangerous cave. There are four volunteers: Abelard, Bobo, Cecilia, and Duncan. The votes of the club members are summarized in the table at right.

volunteer	preferences						
Abelard	1	2	4	3	2	3	3
Bobo	3	1	3	4	3	2	2
Cecelia	2	3	1	1	4	4	4
Duncan	4	4	2	2	1	1	1

a. Which volunteer would win in a plurality vote?

b. Which volunteer would win in a plurality vote with a runoff between the top two finishers? (show your work)

c. Which volunteer would win the Borda count? (show your work)

d. Which volunteer, if any, is the Condorcet winner? (show your work).

e. Each club member is asked who s/he approves of for the job, and the responses are: Abelard & Cecelia; Abelard & Bobo; Cecelia; Cecelia & Duncan; Duncan; Duncan; Bobo & Duncan. Who wins the approval vote?

2.*(20 points)* You put \$1000 in a bank account that pays 6% annual interest, compounded monthly. How much will be in the account in three years?

3.*(20 points)* You put \$1000 in a bank account that pays 6% annual interest, compounded monthly. How long will it take for the account to reach at least \$2000?

4.*(20 points)* Which earns more money (circle your answer, and justify it below):

a. An account earning 10% annual interest, compounded yearly.

b. An account earning 9.75% annual interest, compounded monthly.

c. An account earning 9.5% annual interest, compounded daily.

d. Putting your money in a jar labelled "magic money multiplier".

5.*(20 points)* Which yields the most money (circle your answer, and justify it below):

a. Monthly deposits of \$100 at 12% annual interest, compounded monthly for 12 years.

b. Monthly deposits of \$200 at 6% annual interest, compounded monthly for 12 years.

c. Monthly deposits of \$100 at 6% annual interest, compounded monthly for 24 years.

6. *(20 points)* Mma Makutsi takes out an amortized loan of \$30,000 at 6% annual interest, compounded monthly. Assuming she pays it back by making equal payments at the end of each month for 24 years, how much is Mma Makutsi's monthly payment?