MTH 110
Quiz 5
Summer 2008

Show all work in a neat and organized fashion. Clearly indicate your answers.
50 points possible.

The following formulas may or may not be useful.

$$\text{Percent increase} = \frac{\text{amount of increase}}{\text{original amount}} \quad (\times 100\% \text{ to express as a percent})$$

$$\text{Percent decrease} = \frac{\text{amount of decrease}}{\text{original amount}} \quad (\times 100\% \text{ to express as a percent})$$

$$A = P(1+r)^t$$

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

$$P = \frac{A}{\left(1+\frac{r}{n}\right)^{nt}}$$

$$Y = \left(1+\frac{r}{n}\right)^{n} - 1$$

$$PMT = P\frac{\frac{r}{n}}{1-\left(1+\frac{r}{n}\right)^{-nt}} = P\frac{i}{1-(1+i)^{-m}}, \qquad i = \frac{r}{n}, \qquad m = nt$$

$$\text{Standard divisor} = \frac{\text{total population}}{\text{total number of seats}}$$

$$\text{Standard quota for a state} = \frac{\text{population of that state}}{\text{standard divisor}}$$

$$C = \frac{n(n-1)}{2}$$

1. (4 pts.) How much money should be deposited today in an account that earns 5% compounded quarterly so that it will accumulate to $950,000 in 35 years?

2. (6 pts.) A mortgage of $360,000, with interest at 7.5% compounded monthly, is to be repaid by making equal monthly payments for 30 years. Fill in the first two rows of the amortization schedule, for the first two monthly payments.

Period	Payment	Interest	Balance Reduction	Unpaid Balance
				360,000.00
1				
2				

3. (4 pts.) Three candidates, X, Y, and Z, are running for mayor of a small town. The results of the election are shown in the following preference table.

Number of Votes	1200	800	600	200
1st choice	X	X	Y	Z
2nd choice	Y	Z	X	Y
3rd choice	Z	Y	Z	X

(a) How many people voted in the election?

(b) How many people selected the candidates in this order: Y, X, Z?

(c) How many people selected X as their first choice for the due date?

(d) How many people selected Y as their first choice for the due date?

4. (6 pts.) Four candidates, E, G, H, and T, are running for student council president. The votes are summarized in the following preference table.

Number of Votes	45	33	27	15	3
1st choice	G	H	T	E	H
2nd choice	E	E	H	T	T
3rd choice	H	T	E	H	E
4th choice	T	G	G	G	G

Who is declared the winner using the pairwise comparison method?

5. (10 pts.) The preference table for an election is shown.

Number of Votes	50	40	25	10
1st choice	D	J	J	F
2nd choice	F	F	H	H
3rd choice	H	H	D	D
4th choice	J	D	F	J

Suppose the Borda count method is used. Who is the winner? Is the majority criterion satisfied? Using one or more complete sentences, explain your answer.

6. (10 pts.) The preference table gives the results of a straw vote among three candidates R, S, and T.

Number of Votes	30	24	21	12
1st choice	R	T	S	S
2nd choice	S	R	T	R
3rd choice	T	S	R	T

(a) Suppose the plurality-with-elimination method is used. Who is the winner of the straw vote?

(b) In the actual election, the 12 voters in the last column who voted SRT, in that order, change their votes to RST. Using the plurality-with-elimination method, who wins the actual election? Is the monotonicity criterion satisfied? Using one or more complete sentences, explain your answer.

7. (10 pts.) A country is composed of four states, A, B, C, and D. The population of each state, in thousands, is given in the following table.

State	A	B	C	D
Population (in thousands)	356	492	285	581

According to the country's constitution, the congress will have 50 seats, divided among the four states according to their respective populations.

(a) Find the standard divisor, in thousands. How many people are there for each seat in congress?

(b) Find each state's standard quota.

(c) Find each state's lower quota.

(d) Find each state's upper quota.

(e) Use Hamilton's method to find each state's apportionment of congressional seats.