Econ 172A, Fall 2012: Quiz IV

1. The quiz has 3 forms. You should answer the questions from only one form.
   - If your student identification number ends in 1, 3, 9 answer the questions from Form 1.
   - If your student identification number ends in 2, 4, 8, or 0 answer the questions from Form 2.
   - If your student identification number ends in 5, 6, 7 or if you have no student identification number, answer the questions from Form 3.
2. The only difference between the forms is the capacity of the knapsack.
3. This page is the answer sheet. Hand in only this page.
4. You may not use calculators, books, or notes during this quiz.
5. If you do not know how to interpret a question, then ask me.
6. **Please remain in your seat until the exam is over.**
7. I will collect the quizzes at 4:50.

Fill in the information below (and hand in only this page).

- Fill in the information below:
- NAME:
- STUDENT IDENTIFICATION NUMBER:
- I read the instructions and I am answering the questions corresponding to the appropriate form, which is FORM:

Place answers here. The answers to Parts 1–4 are integers. For Part 5 and Part 6 answer "true" or "false". For Part 7 the answer is a range of integers "between A and B".

1.
2.
3.
4.
5.
6.
7.

Table 1: Knapsack Data

Value	20	18	18	7	1
Weight	10	8	6	4	1
Value/Weight	2	2.25	3	1.75	1

Quiz 4

Consider a knapsack problem in which there are 5 items. Assume that the knapsack has capacity C and the numbers above describe the values and weights of the objects.

There are three forms. The only difference between the forms is the capacity of the knapsack.

Form 1: $C = 20$.
Form 2: $C = 18$.
Form 3: $C = 19$.

Place your answers on the first page. No work is necessary. No partial credit. Please read the questions carefully and answer the question that I ask.

For each question below select the best answer. (Only one answer per question.)

1. The solution to the relaxed problem (ignoring integer constraints) yields an upper bound for the true problem. What is its value?

   Branch on the first item (the one with weight 10 and value 20). This creates two subproblems, one in which you bring the item (call this Subprogram I) and one in which you do not (call this Subproblem II).

2. The solution to the relaxed Subproblem I (ignoring integer constraints) yields an upper bound for the value of Subproblem I. What is the upper bound for value of Subproblem I?

3. The solution to the relaxed Subproblem II (ignoring integer constraints) yields an upper bound for the value of Subproblem II. What is the upper bound for value of Subproblem II?

4. Based on the information from solving relaxed versions of the original problem, Subproblem I and Subproblem II, what is the best lower bound for the value of the original problem?

5. Based only on the computations above, Subproblem I has been fathomed. (Your answer should be either "true" or "false".)

6. Based only on the computations above, Subproblem II has been fathomed. (Your answer should be either "true" or "false".) .

7. Based only on the upper and lower bounds obtained from the computations above, what is the most precise statement you can say about the value of the problem? (Your answer should be in the form: "The value is an integer between A and B." $A = B$ would be possible if you know the value.)