CMPE 532 Final Exam
Fall 2008

Open book, open notes
Time: 120 minutes

1) Consider the following constraint logic program.

```
lenght([],0).
length([H|T], 1+Z):-length(T,Z).
```

Show the derivation tree for length([a],R). (20 pts)

2) Write the definition of a predicate "separate" that separates a list of integers according to whether they are odd or even, returning two lists. For example, separate([1,2,3,4],X,Y) should succeed, binding X to [1,3] and Y to [2,4]. (20 pts)

3) Assume we give the goal [[a,b],[c],d,e]=[X|[Y|Z]] to a constraint logic programming system. To what are the variables X,Y and Z bound in the result? (15 pts)

4) Consider the labelingsplit predicate defined in page 264 of your textbook. Assume we have a predicate "show(L)" which takes a list of variables, and prints their name,as well as the minimum value that the variable can take,, and the maximum value the variable can take. For example, for the goal "[X,Y,Z]::[1..9], X<2, Y>5, show([X,Y,Z])" would print on the screen X 1 1, Y 6 9, Z 1 9, followed by a newline.

Assume we change labelingsplit given in page 264 in the following way:

```
labelingsplit([V|Vs]):-
        show([V|Vs]),
        mindomain(V,Min),
       .....
```

What is printed on the screen for the goal "[X,Y]::[1..4], labelingsplit([X,Y])" until the first time the goal succeeds? (20 pts)

5) Consider the definition of "deriv" given on page 300 of your textbook.
What is R bound to in the execution of deriv(mult(mult(3,power(x,2)), mult(4 ,x)), R) ? (10 pts)

6) Trace the execution of Incremental Gauss-Jordan solver given in Figure 10.3 (p. 354) of your textbook to solve the constraint $X=3 \wedge Y=X+Z \wedge Z=2 \wedge W=Y+1$. (15 pts)