# ICOM 4036 – Programming Languages
**Otoño 2003**

**Ejercicios de práctica**
**Examen Parcial II**

1. Write a logic program in Prolog to compute the greatest common divisor (GCD) of 2 integer arguments. The GCD can be defined recurrently as:

    a. GCD(a, b) = b if b divides a

    b. GCD(a, b) = GCD(b,r) otherwise, where r = a MOD b

2. Write a Prolog program that sums the elements of a list

3. Write a Prolog program that finds the maximum element of a list

4. Consider the following Prolog rules:

    ```
    myappend([], Y, Y).

    myappend([HX], Y, [HZ]) :- myappend(X,Y,Z).

    myprefix(X,Z) :- myappend(X,Y,Z).

    mysuffix(Y,Z) :- myappend(X,Y,Z).

    sublist1(S,Z) :- myprefix(X,Z), mysuffix(S,X).

    sublist2(S,Z) :- mysuffix(S,X), myprefix(X,Z).
    ```

    What is the result of the following queries:

    a. **sublist1([e], [a,b,c]).**

    b. **sublist2([e], [a,b,c]).**

    Try to figure the results out without typing the program in the interpreter. This should give you practice on how the prolog inference engine works.

5. Write a Prolog program that succeeds if two lists have and empty intersection.

6. Write a Prolog program that succeeds if two lists are equal.

7. Write tail recursive versions of the Prolog programs developed above.

8. Modify the C++ `LandVehicle` class hierarchy discussed in class in the following ways:

    a. Add a private data member horsepower to all LandVehicles

    b. Add a private data member allowedInHigway that is set to true if the vehicle is allowed to transit highways. Bicycles are not allowed, Cars are allowed and motorcycles are allowed only if they have 100 horse power or more.

    c. Modify all vehicle constructors adequately to handle the data member added in (b)

9. Write a polymorphic function HPcmp that receives two vehicles v1 and v2 and returns 1 if v1 has more horsepower than v2, -1 if v1 has more horsepower and 0 otherwise.