Mini Assignment-2

[**P16**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p16.pl)**(\*\*) Drop every N'th element from a list.**

Code:

drop\_element([], \_, []).

drop\_element(X, N, Y) :-

X \= [],

N\_ is N-1,

take(N\_, X, S),

put(N, X, E),

drop\_element(E, N, E\_),

append(S, E\_, Y).

take(\_, [], []).

take(0, \_, []).

take(N, [X|Xs], [X|Y]) :- N > 0, N\_ is N-1, take(N\_, Xs, Y).

put(\_, [], []).

put(0, X, X).

put(N, [\_|Xs], Y) :- N > 0, N\_ is N-1, put(N\_, Xs, Y).

Output:

drop\_element([p,q,r,s,t,u,v,w], 6, X).

**X** = [p, q, r, s, t, v, w]

drop\_element([1,2,3,4,5,6,7], 4, X).

**X** = [1, 2, 3, 5, 6, 7]

[**P17**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p17.pl)**(\*) Split a list into two parts; the length of the first part is given.**

Code:

split(X, N, P1, P2) :- take(N, X, P1), put(N, X, P2).

Output:

split([a, b, c, d, e, f, g], 3, P1, P2)

**P1** = [a, b, c],  
**P2** = [d, e, f, g]

split([1,2,3,4,5,6,7], 3, P1, P2)

**P1** = [1, 2, 3],  
**P2** = [4, 5, 6, 7]

[**P19**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p19.pl)**(\*\*) Rotate a list N places to the left.**

Code:

rotate\_n(X, N, Y) :-

length(X, L), N\_ is N mod L, split(X, N\_, L1, L2), append(L2, L1, Y).

Output:

**rotate\_n([a, b, c, d, e, f, g],4 , X).**

**X** = [e, f, g, a, b, c, d]

**rotate\_n([1,2,3,4,5,6,7],3 , X).**

**X** = [4, 5, 6, 7, 1, 2, 3]

[**P21**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p21.pl)**(\*) Insert an element at a given position into a list.**

Code:

insert(X, L, N, R) :- N\_ is N-1, split(L, N\_, L1, L2), append(L1, [X|L2], R).

Output:

insert(hi,[a,b,c,d],4,L).

**L** = [a, b, c, hi, d]

insert(Hello,[a,b,c,d],2,L).

**L** = [a, Hello, b, c, d]

[**P22**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p22.pl)**(\*) Create a list containing all integers within a given range.**

Code:

create\_list(N, N, [N]).

create\_list(A, B, [A|R]) :- A \= B, A\_ is A + sign(B-A), create\_list(A\_, B, R).

Output:

create\_list(3, 12, L).

**L** = [3, 4, 5, 6, 7, 8, 9, 10, 11, 12]

[**P26**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p26.pl)**(\*\*) Generate the combinations of K distinct objects chosen from the N elements of a list**

Code:

combination(0, \_, []).

combination(N, X, [H|R]) :-

0 < N, tails(X, [H|T]), N\_ is N-1, combination(N\_, T, R).

tails(X, X).

tails([\_|Xs], T) :- tails(Xs, T).

Output:

combination(3,[a,b,c,d],L).

L = [a, b, c]

**L** = [a, b, d]

**L** = [a, c, d]

**L** = [b, c, d]

**false**

combination(4,[1,2,3,4,5,6],L).

**L** = [1, 2, 3, 4]

**L** = [1, 2, 3, 5]

**L** = [1, 2, 3, 6]

**L** = [1, 2, 4, 5]

**L** = [1, 2, 4, 6]

**L** = [1, 2, 5, 6]

**L** = [1, 3, 4, 5]

**L** = [1, 3, 4, 6]

**L** = [1, 3, 5, 6]

**L** = [1, 4, 5, 6]

**L** = [2, 3, 4, 5]

**L** = [2, 3, 4, 6]

**L** = [2, 3, 5, 6]

**L** = [2, 4, 5, 6]

**L** = [3, 4, 5, 6]

[**P31**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p31.pl)**(\*\*) Determine whether a given integer number is prime.**

Code:

prime(N) :- integer(N), N > 1, \+ has\_factor(N, 2).

has\_factor(N, K) :- K \* K =< N, N mod K =:= 0.

has\_factor(N, K) :- K \* K =< N, K\_ is K + 1, has\_factor(N, K\_).

Output:

prime(23).

**true**

prime(4).

**false**

[**P32**](https://www.ic.unicamp.br/~meidanis/courses/mc336/2009s2/prolog/problemas/p32.pl)**(\*\*) Determine the greatest common divisor of two positive integer numbers.**

Code:

prime\_factors(N, Fs) :- N > 1, prime\_factors(N, 2, Fs).

prime\_factors(1, \_, []) :- !.

prime\_factors(N, P, Fs) :-

P =< N, N mod P =\= 0, !, next\_prime(P, P\_), prime\_factors(N, P\_, Fs).

prime\_factors(N, P, [P|Fs]) :-

P =< N, N\_ is N / P, prime\_factors(N\_, P, Fs).

next\_prime(P, P\_) :- P\_ is P + 1, prime(P\_), !.

next\_prime(P, N) :- P\_ is P + 1, next\_prime(P\_, N).

Output:

prime\_factors(225, L).

**L** = [3, 3, 5, 5]

prime\_factors(1225, L).

**L** = [5, 5, 7, 7]