Logic Programming – Laboratory 4
Recursion

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1 Exercises

1. Write a predicate which returns the length of a list.

Examples:
$? - length\_list([a, 2, b, 4, 5], L)$.
will return $L = 5$
$? - length\_list([], L)$. will return $L = 0$.

2. Write a predicate which returns the reverse of a list.

Examples:
$? - reverse\_list([1, 2, 3, 4, 5], R)$.
will return $R = [5, 4, 3, 2, 1]$
$? - reverse\_list([], R)$. will return $R = []$.

3. Write a predicate which returns the sum of the elements from a list.

Examples:
$? - sum\_elem\_list([1, 2, 3, 4, 5], S)$.
will return $S = 15$
$? - sum\_elem\_list([], S)$. will return $S = 0$.

4. Write a program in Prolog which calculates:

$f(X) = (X^{45} - 3 * X^2) + 5$

5. Write a program in Prolog which calculates:

$f(X, Y, Z) = (X^{100} - 3 * Y) + (5 * Z + X * Y)$

6. Write a program which will return the list of elements on the odd positions from a list of integers.

Examples:
$? - odd\_elem\_list([1, 3, 4, 2, 3, 5], OddElem)$.
The result will be $OddElem = [1, 4, 3]$.
$? - odd\_elem\_list([1], OddElem)$.
The result will be $L = [1]$.

7. Write a program which will return the list of elements on the even positions from a list of integers.

Examples:
$? - even\_elem\_list([1,3,4,2,3,5], EvenElem)$.
The result will be $EvenElem = [3,2,5]$.
$? - even\_elem\_list([3], EvenElem)$.
The result will be $EvenElem = []$.

8. Write a program which will return the list of odd elements from a list of integers.

Examples:
$? - odd\_list([1,3,4,2,7,5], X)$.
The result will be $X = [1,3,7,5]$.
$? - odd\_list([4], X)$.
The result will be $X = []$.

9. Write a program which will return the list of even elements from a list of integers.

Examples:
$? - even\_list([1,3,4,2,7,5], X)$.
The result will be $X = [4,2]$.
$? - even\_list([3], X)$.
The result will be $X = []$.

10. Write a program which calculates the factorial of a natural number.

Examples:
?- factorial(5,X).
X= 120