
Knowledge representation (INFO0049-1)

Exercise session 2

24 Feb 2015

Try to draw search trees wherever possible to see how prolog executes a query

Arithmetic Exercise

1. Write a predicate `sum(+Number, -Sum)` that succeeds if 'Sum' is the sum of all the digits in the positive integer number 'Number'.

?- `sum(26, X)`.

`X = 8;`
`true.`

2. Define a predicate `is_even(+Number)` that succeeds if the positive integer number 'Number' is an even number and fails otherwise.

?- `is_even(36789)`.

`true.`

Extend the above and write another predicate `all_even(+Number)` that succeeds if all the digits in the number 'Number' are even. Draw search trees for `all_even(36789)` and `all_even(688)`.

?- `all_even(468)`.

`true.`

?- `all_even(4638)`.

`false.`

3. Write a predicate `is_double(+Number)` that succeeds if the positive integer number 'Number' contains two equal digits. For example, `is_double(12452)` succeeds whereas `is_double(134567)` fails.

?- `is_double(134567)`

false.

?- is_double(12452)

true.

4. Define a predicate gcd(+A, +B, -C) that succeeds if C is the GCD (greatest common divisor) of the two positive integer numbers A and B.

?- gcd(2,6,X).

X = 2;
false.

5. Define a predicate prime(+Number) that succeeds if 'Number' is a prime number.

?- prime(3)

true.

6. Goldbach's conjecture is one of the most famous facts in number theory that has not been proved to be correct in the general case. It says that: Every positive even number greater than 2 is the sum of two prime numbers.

Example: $28 = 5 + 23$.

Define a predicate goldbach(+X, -Y, -Z) that succeeds if $X = Y + Z$ where X is an even integer greater than 2 and Y, Z two prime numbers.
