



University of Arizona, Department of Computer Science  
CSc 372 — Assignment 4 — Due noon, Mon Oct 24 — 5%

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## 1 Introduction

The purpose of this assignment is to familiarize yourself with Prolog.

Every predicate should be commented. At the very least, the comments should state what the predicate does, which arguments it takes, and what result it produces.

You should make your predicates as simple and elegant as possible.

You will be graded primarily on **correctness**, **elegance**, **clarity**, and **documentation**.

This assignment is graded out of 100. It is worth 5% of your final grade.

## 2 Prolog Arithmetic

1. Write a predicate `abs(X,Y)` which takes a number `X` as input and computes the absolute value  $|X|$  as output: [10 points]

```
| ?- abs(0,0).  
yes  
| ?- abs(-1,1).  
yes  
| ?- abs(-1,Y).  
Y = 1  
| ?- abs(5,Y).  
Y = 5
```

2. Write a Prolog predicate `seq(First, Last, N)` that instantiates `N` to each integer value from `First` through `Last`, inclusive. `First` and/or `Last` may be negative. Assume that `First` and `Last` are integers. Examples: [30 points]

```
| ?- seq(1, 3, X).  
X = 1 ? ;  
X = 2 ? ;  
X = 3 ? ;  
no  
  
| ?- seq(-3, 2, X).  
X = -3 ? ;
```

```

X = -2 ? ;
X = -1 ? ;
X = 0 ? ;
X = 1 ? ;
X = 2 ? ;
no

| ?- seq(1,1,X).
X = 1 ? ;
no

| ?- seq(2,-2,X).
no

```

### 3 Parts List

Consider this database of facts, describing what something is made up of:

```

has(bicycle,wheel,2).
has(bicycle,handlebar,1).
has(bicycle,break,2).
has(wheel,hub,1).
has(wheel,spoke,32).
has(bicycle,frame,1).

```

```

has(car,steering_wheel,1).
has(car,stereo,1).
has(car,tires,4).

```

Write a predicate `partof(X,Y)` that succeeds if Y is a part of X:

[30 points]

```

| ?- partof(wheel,spoke).
true
| ?- partof(bicycle,spoke).
true
| ?- partof(car,spoke).
no

```

`partof(X,Y)` can also be used to enumerate the parts that makes up an object, or of which an object is a part:

```

| ?- partof(bicycle,X).
X = wheel ? ;
X = handlebar ? ;
X = break ? ;
X = frame ? ;
X = hub ? ;

```

```

X = spoke ? ;
no
| ?- partof(X,spoke).
X = wheel ? ;
X = bicycle ? ;
no

```

## 4 Dating Database

You are running a computerized dating service and maintain a database consisting of the following facts:

```

% name, gender, height(cm), age, education (hs,college,masters,phd)
person(lisa, female, 180, 30, phd).
person(jenny, female, 167, 25, hs).

person(bob, male, 180, 40, phd).
person(charles, male, 190, 30, masters).
person(arnold, male, 177, 29, hs).

```

You know from experience that a woman will only date a man if

1. he is at least as tall as she is,
2. his educational level is at least as high as hers,
3. he is not younger, and no more than 10 years older than her.

1. Write a recursive rule `edu_le(A,B)` that succeeds if the educational level `A` is less than or equal to `B`: [15 points]

```

| ?- edu_le(hs,hs).
yes
| ?- edu_le(hs,college).
yes
| ?- edu_le(hs,phd).
yes
| ?- edu_le(phd,masters).
no

```

2. Write a Prolog predicate `dateable(Female, Male)` which encodes the dating rules above: [15 points]

```

| ?- dateable(lisa,charles).
no
| ?- dateable(lisa, bob).
yes
| ?- dateable(jenny,arnold).
yes

```

## 5 Submission and Assessment

The deadline for this assignment is noon, Mon Oct 24. It is worth 5% of your final grade.

You should submit the assignment electronically using the `Unix` command

```
turnin cs372.4 ass4.pl
```

**Don't show your code to anyone, don't read anyone else's code, don't discuss the details of your code with anyone. If you need help with the assignment see the instructor or the TA.**