

CSC 3310 Concepts of Programming Languages

Fall 2017

Assignment Name	Scheme Programming Assignment
Due Date	November 29 th , 2017
Delivery Method	Through Canvas Only
Points	10% of final grade

Motivation

Around 1930's one mathematical model of computation was created called the Lambda Calculus, with time it was proven to be equivalent to the Turing Machine model, meaning that both models have the same computational capability. Functional programming is an elaboration based on Lambda Calculus, where programming is declarative as opposed to imperative as most programming languages students have been exposed so far. At a point in the development of Computer Science, functional programming was thought to be applicable to solve AI problems. Besides being an academic type of programming, industry also uses functional programming, for instance Erlang is used in the telecommunications industry. There are modern functional programming languages like Scala and F#.

In this assignment, students will develop simple programs in Scheme in order to practice this language and expose them to a completely different paradigm of programming. Up to this moment, most of the students have been working and coding with imperative and object oriented languages, and a declarative language should pose a new challenge, as it requires a different way to think.

Description

Write a Scheme program that implements the following functions:

- (convert number base)
The function should convert the number in base 10 to its equivalent in base base
- This procedure, called roll-till-you-win, takes as argument a particular bet and simulates the rolling of a die until the bet wins

```
(define (roll-till-you-win bet)
  (let ((die-roll (1+ (random 6))))
    (display die-roll)
    (newline)
    (cond ((=die-roll bet) (display "You won!"))
          (else (roll-till-you-win bet)))))
```

Modify roll-till-you-win so that the procedure makes a random bet at each roll. The new procedure should take no arguments and simply keep rolling the die until the random bet happens to be the same as the new roll. Here is a sample printout of the result:

```
Bet: 5 Result: 4
Bet: 1 Result: 3
Bet: 4 Result: 4
You won!
```

Assignment Requirements

- Good programming practices
 - o Correct and readable indentation
- This is an strictly individual assignment

Delivery Method

- Files to be uploaded
 - o assignment.scm [You MUST name your program this, failure will result in zero grade]
- Uploaded in Canvas

Assessment and Grading

Assessment will consider the following factors in the grading of the project:

- Adherence to instructions
- Correct function of the program
- No runtime errors
- Late deliveries will have a zero mark
- Plagiarism will have a double zero mark (in addition to losing 15% of your final grade, the group that plagiarizes will lose an additional 15% of their final grade), besides there will be a report filed in the students' academic record.
- Each program will be loaded in Scheme and test it to check if the functions are in working order.

Extra Challenge (12 points, 2 bonus points)

In addition to the assigned procedures, write a third procedure: `(list-primes n)` This procedure will print the prime numbers up to n. Sample:

```
(list-primes 20)
```

```
2
```

```
3
```

```
5
```

```
7
```

```
11
```

```
13
```

```
17
```

```
19
```