AI Assignment: First Lisp Interactions and Problem Solving

Overview

This very modest programming exercise is intended to provide you with an opportunity to engage with the Lisp interpreter in simple meaningful ways. You will be asked to mimic a couple of sample Lisp sessions, previously presented, and to solve a couple relatively simple numeric problems in Lisp. As you perform these tasks, you are asked to build a solution document which will represent your work on this assignment. Finally, you are asked to post your solution document to your AI work site.

Note: When mimicking previously presented sessions, no worry if you mistype something. Simply leave the misstep in, and, after returning to the top level of the Lisp interpreter, carry on with what you meant to type. This is a common enough occurrence.

What will you learn?

Upon successful completion of this exercise it is anticipated that you will be able to:

1. Successfully interact with the Lisp interpreter
2. Make effective use of some basic forms
3. Create and load a Lisp file
4. Solve a simple numeric problem in Lisp

Task 1: Mimic the "Basic Forms" demo

Simply do the following:

1. Start a Lisp process.
2. Mimic the "Basic Forms" Lisp session from the "First Forms" lesson.
3. Copy/paste the session from the Lisp process to the solution document that you are being asked to build in order to be able to properly present your work.

Task 2: Mimic the "Numeric Forms" Demo

Simply do the following:

1. Start a Lisp process.
2. Mimic the "Numeric Forms" Lisp session from the "First Forms" lesson.
3. Copy/paste the session from the Lisp process to your solution document.

Task 3: Solve the "White Percent of a Standard Die" problem

Problem Working by analogy with the "Triangle of Squares" problem previously presented, solve the following "White Percent of a Standard Die" problem:

> Suppose a standard die measures 3.25cm on the edge of a face. Further, suppose that each dot on the die has a diameter of length one-fifth the edge of a face. What percent of the surface area of the die is white?

Task First, write a solution to the problem in Lisp, placing your solution in a file dedicated to solving just this problem. Next, generate a demo by loading the file into Lisp and asking Lisp to display the relevant bindings, in a bottom up manner.

Constraint Use the approach that makes use of variables to record problem specific information, the solution, and partial results that lie between these two extremes. That is, in an appropriately named file dedicated to solving just this problem, simply ask for each of these items to be evaluated, just like in the "Triangle of Squares" example. Your goal should be to solve the problem in a conceptually clean way.

Artifacts Incorporate the Lisp file that solves the problem into your solution document. Also, incorporate a demo which loads the file and displays the bindings established in a bottom up manner. (Please see the "Triangle of Squares" demo if you need clarification on just what this means.)

Task 4: Solve the "Tethered Goat" problem

Problem Working by analogy with the "Triangle of Squares" problem previously presented, solve the following "Tethered Goat" problem:

> A goat is tethered to one corner of a barn that is isolated in a huge grassy field. In whatever units, the barn measures 62 x 44, and the rope is of length 88. What is the area of land on which the goat gets to graze?

Task First, write a solution to the problem in Lisp, placing your solution in a file dedicated to solving just this problem. Next, generate a demo by loading the file into Lisp and asking Lisp to display the relevant bindings, in a bottom up manner.

Constraint Use the approach that makes use of variables to record problem specific information, the solution, and partial results that lie between these two extremes. That is, in an appropriately named file dedicated to solving just this problem, simply ask for each of these items to be evaluated, just like in the "Triangle of Squares" example. Your goal should be to solve the problem in a conceptually clean way.

Artifacts Incorporate the Lisp file that solves the problem into your solution document. Also, incorporate a demo which loads the file and displays the bindings established in a bottom up manner. (Please see the "Triangle of Squares" demo if you need clarification on just what this means.)

Task 5: Web work site

Please take a close look at the model solution document that is provided as an accompaniment to the assignment specification, and do your best to make good use of the model in structuring your solution document. Please save your solution document, once you have assured that it is in order, as a **pdf** file. Then make "an entry" for this programming challenge on your web work site. That is, add a nicely contextualized link to the **pdf** file.

Due Date

Wednesday, September 7, 2022