PSET 1 Solutions

Problem 1

Part a: You can generate a listing by using Alt+F2 or by selecting Run, Compile to Listing in the toolbar. A sample listing is shown below.

```
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Compiling: c:\docume~2\jk\desktop\adatex~1\pset1~1\drunken_spider.adb (source file time
stamp: 1998-08-11 14:21:06)

  1. WITH Spider;
  2. PROCEDURE Drunken_Spider IS
  3. ----------------------------------------------------------
  4. --| Spider tries to tour its room but has drunk too much, so
  5. --| takes a random number of steps and may hit the wall. If the
  6. --| spider hits the wall, it turns around and keeps going.
  7. --| Author: M. B. Feldman, The George Washington University
  8. --| Last Modified: July 1998
  9. ----------------------------------------------------------
 10.
 11. BEGIN -- Drunken_Spider
 12.
 13.   Spider.Start;
 14.
 15.   LOOP                    -- keep going forever
 16.
 17.     Spider.Face(WhichWay => Spider.RandomDirection);
 18.     Spider.ChangeColor(NewColor => Spider.RandomColor);
 19.
 20.     -- Spider will count steps correctly
 21.     -- but might change direction
 22.     FOR Count IN 1..Spider.RandomStep LOOP
 23.
 24.       IF Spider.AtWall THEN
 25.         Spider.TurnRight;
 26.         Spider.TurnRight;
 27.       END IF;
 28.
 29.       Spider.Step;
 30.
 31.     END LOOP;
 32.
 33.     Spider.TurnRight;
 34.
 35.   END LOOP;
 36.
 37. END Drunken_Spider;
 38.
38 lines: No errors
```

Part b: You get an exception either

- Exception: Spider hit the wall
- raised SCREEN.WIN32_FILL_SCREEN_ERROR : screen.adb:99

Problem 2:

Problem Statement

You are taking a vacation in the beautiful country of LaLa Land. You rent a car there, and you're driving on the highway. Then you notice that the distances are measured in *furlongs*. Each furlong is 1/8 mile (really!).

Not only that, but speeds are measured in *furlongs per fortnight (fpf)*. Each fortnight is two weeks or 14 days (really). The highway speed limits are, of course, given in these units.

Worse still, the speedometers on the cars show miles per hour (mph) as is used here in the United States. So how do you know if you are exceeding the speed limit?

What you need is a quick calculator program, so that if your speedometer reads, for example, 65 mph, you can input this number and the calculator will tell you immediately what your speed is in fpf, so you can compare it with the speed limit signs.

Analysis

Input : Speedometer reading in miles per hour (mph)
Output : Speed in feet per furlong (fpf)
Constraints :

- The fpf reading may not be a whole number so real numbers have to be used.
- Constants used

3. Display the fpf reading to the user.

Refinement

1. Define the input variable as Miles_Per_Hour
2. Define the output variable as Furlong_Per_Fortnight
3. Define the constant conversion factor Mph_To_Fpf to be 2688.0
   (Using floating point computation hence the .0 at the end)
4. Get input reading in mph from user.
5. Compute the output value using: Miles_Per_Hour * Mph_To_Fpf
6. Display output to the user.

Test Plan

Test Case	Input	Expected Output
1	0	0.0
2	65	174720.0
3	-1	-2688.0

Code Listing

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Compiling: c:\docume~2\jk\desktop\adatex~1\pset1~1\speed_converter.adb (source file time stamp: 2003-02-11 20:45:52)

```
1. with Ada.Text_Io;
2. with Ada.Float_Text_Io;
3. use Ada.Text_Io;
4. use Ada.Float_Text_Io;
5.
6. ------------------------------------------------------
7. -- Program Name     : Speed Converter
8. -- Purpose          : To convert between miles per hour
9. --                    and furlongs per fortnight
10. -- Programmer       : Jayakanth Srinivasan
11. -- Date Last Modified : 02/10/03
12. -- Constraints      : The assumption is that negative
13. --                    values will not be entered
14. ------------------------------------------------------
15.
16. procedure Speed_Converter is
17.    Mph_To_Fpf : constant := 2688.0;
```