Project 7 Overview

- Using random numbers:
  - To approximate pi
  - Simulate the flipping of a fair coin
  - Simulate the rolling of a fair 5-sided die
- Use a loop to continue processing a menu choice until exit is chosen by the user
- When comparing the sample solution to your solution, *run both programs on the same computer.*

Assumptions and Constraints

- ***Arrays are not allowed***
- ***Global variables are not allowed***
- Assume that the menu choice options are the only values that have to be tested. **Menu choice is to be read into an integer variable ⇐**.
- Seed and iteration numbers are valid positive integers less than 2147483647. No testing is required on these values.

Assumptions and Constraints

- ***Five Functions are required***.
- Print Menu – Print out the menu options
- Obtain Integer – obtain the integer selection made by the user
- Calculate pi
- Flip a coin
- Toss a die

All necessary input and output for these functions is handled in the function itself

Approximating pi

- Use random numbers to determine an x-y co-ordinate pair. Values are between 0 and 1
- Determine if the x-y pair lies inside a circle of radius 1 or outside the circle.
- The ratio of the number of x-y pairs inside the circle to the number of pairs generated is used to approximate pi:

  pi ~4*(# of pairs inside)/(# of pairs generated)
- Output for this section is to match the output shown by the sample solution

Flipping a Fair Coin

- Use random numbers to determine if the flip of the coin is heads or tails. Each outcome is equally likely, however your simulation results will not show a result of exactly 50%
- Output is the percentage of flips that are heads (# of heads)/(# of total flips) and the percentage that are tails.
- Output for this section is to match that of the sample solution

Rolling a Fair Die

- Use random numbers to determine which side shows up when the die is rolled.
  - Values less than 0.2 represent side #1
  - Values greater than or equal to 0.2 and less than 0.4 represent side #2
  - Values greater than or equal to 0.4 and less than 0.6 represent side #3
  - Values greater than or equal to 0.6 and less than 0.8 represent side #4
  - Values greater than or equal to 0.8 represent side #5
- Calculate the percentages for each side based on the total number of rolls made.

General Information

- The rand() and srand() functions are part of the header file cstdlib. srand() is to be called once only – at the beginning of the program.

- For the number of iterations, choose odd values, and avoid values that are even – especially ones ending in 0 (I.e 100)

- Largest integer value to use is 2147483647

Function Requirements

- Function Prototypes must be used – not using prototypes will result in a score of 0
- Function Prototypes go in the global area above main
- All user defined function definitions must be placed below main. Placing function definitions above main will result in a score of 0

Function Restrictions

- All user defined functions must be called from main – exception is the PrintMenu function.
- The PrintMenu function is to print the menu only – it is to be a void function with no parameters.
- Recursive Function calls (a function calls itself) are not allowed.

Integer Testing

- The only integer value that needs to be tested is the menu choice.
- A function to obtain any integer must be written to obtain the menu choice –
  - this function will return the integer value entered.
  - It will test and correct invalid characters entered only.

Miscellaneous

- **READ the Project Description, the Project Addendum and these slides.**
- Sample Solution:

/home/work/cpe211/Executables/Project_07/Project_07_solution

- Comparision Script:

/work/cpe211data/Project_07/CompareSolution.bash Project_07.cpp