ASTRONOMY 598: MONTE CARLO METHODS HOMEWORK 4

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README

This directory contains the code that answers question from homework 4 while this document provides additional content for the same questions. Specifically, `run_hw4.py` code implements the Monte Carlo integration function `volume4Dsphere` and includes a script to integrate the volume of a 4D sphere with unit radius for various numbers of integration points. The script `run_hw4.py` generates the accompanying figure with error bars as well. To run, enter `python run_hw4.py`.

Running on Hyak

To run the code on Hyak, follow the instructions given below.

1) Create an interactive session by entering `qsub -I -l walltime=hr:min:sec` where hr = 03 is a safe amount of time

2) Find your favorite python distribution (2.7+ for this code) using `module avail`

3) Load the python distribution via `module load (name of package found using module avail)`. I recommend loading `anaconda_2.4`.

4) Run the script by typing `python run_hw4.py`

Problem 1

The code and figures for all parts are given in the accompanying file.

1b,c. See the code in `run_hw4.py` for the function implementation.

1d. See the .png file for the plot. As N increases, the error bars decrease dramatically since for Monte Carlo integration, the error scales as $1/\sqrt{N}$.