Astronomy 3Y03 Winter 2017
Assignment #1
Due Monday January 16, 9:30 am

This assignment is designed to introduce you to some of the tools you will need to succeed in this course. One of those tools is collaboration. Feel free to discuss the assignment with as many classmates, TAs, professors, friends, and search engines as you want. However, you must write up your own individual solutions, and properly reference any information that is neither common knowledge nor of your own creation. If you have any questions about references, please come and see Dr Sills before the assignment is due.

As with any persuasive writing, make sure you give me all the information I need, and in a format that makes it easy for me to find that information.

Solutions to this assignment can be handed in online on Avenue to Learn in PDF format ONLY, or on paper in class.

1. [5 marks] Using the ADS Abstract Service, find the following information:
    a. What was the first paper that Dr Sills published?
    b. What is Dr Parker's most cited paper?
    c. How many papers has Dr Wadsley published? How many are refereed?
    d. What is the topic of many of Dr Wilson's papers?
    e. What was the first paper published by an astronomer at McMaster?

2. [5 marks] Choose a day to access the e-print server astro-ph. Pick a paper. Tell me what it is about, what its status is (submitted/accepted/other) and why it caught your eye.

3. [7 marks] Use LaTeX to create a "paper" in The Astrophysical Journal format. In that paper I would like you to include:
    a. A title
    b. Your name
    c. A section heading
    d. A paragraph about why you are taking this course and what you want to do after finishing your degree at McMaster
    e. A famous equation
    f. A citation to something in the astronomical literature, and a reference in ApJ format

4. [8 marks] For one of the later assignments in this course, you will be asked to numerically integrate four differential equations in four dependent variables. A very robust way of solving such a problem is using the Runge-Kutta technique. For this assignment, you will write your own Runge-Kutta integrator and use it to solve a simple system of two equations, with a known analytic solution so you can check your work.

a. Make sure you have an account on phys-ugrad, and that you know your password. If you don't, please contact Dr Sills.
b. Obtain the Runge Kutta instructions from Avenue and write a short program to solve the system of equations given. Make sure that you structure your program in the way that is suggested, and don't hard-code too much, because you're going to want to modify the program for the later assignment.
c. Email your code to me at asills@mcmaster.ca. I will compile and run the code, so make sure that are necessary files are included, the code is commented, and the output is in a reasonable form. If there are any parameters that the user should input, tell me what values I should use.
d. Include in your write-up a plot of both your numerical solution and the analytic solution. Plot numerical solutions for three values of h -- something really bad, something pretty good, and then your best value.