PHYS 2326
March 27, 2014

HOMEWORK SET 9 -Corrected

PROBLEM 1: (10 points) You were given a program, `struct4homework.cpp` that uses a struct type called "`stardata`" and prints out physical properties of the Sun. Modify the program so that it prints out the physical properties of the Sun followed by the physical properties of Sirius, the brightest star in the sky. Do this by adding another struct of the type `stardata`.

PROBLEM 2: (30 points) For z in the interval $0 < z < \pi/2$ the function $f(z)$ satisfies the differential equation

$$\frac{d^2 f}{dz^2} + f = z^2 + 2$$

along with the conditions

$$f(0) = 1 \qquad f(\pi/2) = (\pi/2)^2 + 1\,.$$

Use the LUdecomposition program for a 4x4 matrix to solve this using finite differencing, and have the program print out your values at the nodes and the values at the nodes for the analytic solution.

Hand in the program LUdecomp.cpp along with A.dat and B.dat for the program.

[NOTE/HINT: The values at $z = 0$ and $z = \pi/2$ are known and should not be treated as unknowns. The 4 unknowns should be the values of f at $z \equiv z_0 = \pi/10$, $z \equiv z_1 = 2\pi/10$, $z \equiv z_2 = 3\pi/10$, $z \equiv z_3 = 4\pi/10$.