Student Self-Assessment & Check list

AST3310 Home Exam #2

This word-document is like the document used to grade your home exam. We want you to:

- Check that you have met the requirements you are graded on.
- Write where each point giving task is answered in your delivery (can in some cases be naturally split over multiple locations).
- Evaluate and write how many points you think you will score on each task.
- Export it as a pdf and submit it with the project.

#	Requirements	Where is it done?	Score	Max score
Ex	*Abstract* *To get all the points, you must …*	*Page 1, col 1, line 1*	*3*	*5*

S1	**Sanity check:**
	• For the tables and ex 5.1:
	  ○ Calculate numbers with your code.
	  ○ Print given sanity values, calculated values, and relative errors to screen.
	  ○ Check that rel. errors are smaller than a tolerance. If not, write a warning.
	• Plot cross section and temperature gradients. Check with eyes.
		lines 90-96, 297-326 for the sanity check definitions, ex 5.1 check line 529, other sanity checks 514-521	12	15

C1	**Code readability:** • Easy and clear how to run the code. • Not unnecessarily long (1000+ lines is too much) • Descriptive function and variable names (e.g. `f_con` for convective energy flux) • Well commented means neither 0 comments nor more comments than lines of code. ○ Fewer comments are needed in a well written code.	whole code	10	10

R1	**Report question 1: Governing equations**
	• Write and describe all 5 governing equations correctly.
	  ○ What are the parameters?
	  ○ What does the equation say/mean?
		page 2 in the report	5	5

R2	**Report question 2: Mean molecular weight**
	• Describe how to get μ, preferably with an equation.
	  ○ Do not du unnecessary simplifications (to metals).
	  ○ Remember the difference between He-3 and He-4.
	• Calculate a number (close to 0.6) and put it in the report.
		page 1 in report	5	5

R3	**Report question 3: Do exercises 5.11-5.13** • Derive the three equations. • Explain your steps, especially if you make assumptions, neglect terms, or omit unphysical solutions.	page 3, column 2 in the report, with grounds in theory presented on page 2 column 2	10	10

#	Requirements	Where is it done?	Score	Max score

R4	**Report question 4: Parameter scan**
	• Make all parameter scans ($R_0, T_0, \rho_0, P_0, L_0$).
	  ○ Minimum 3 sims per scan, incl. base condition
	  ○ Plot results and put them in the report
	• Comment on impact of changing the different parameters, and if some give similar effects.
		code line 551 project2.py for parameter scan, results page 6 columns 1 and 2, as well as page 7 column 1. impact of changing parameters discussed on page 9 column 1 and 2.	10	10

R5	**Report question 5: Best model**
	• Write clearly which parameters were changed in your best model. Give all the numbers $m_0, r_0, L_0, \rho_0, T_0$ in units of $M_\odot, R_\odot, L_\odot, \bar{\rho}$, K, respectively.
	• Write clearly if the goals were met. They are:
	  ○ L, m, r all going down to within 5% of L_0, m_0, r_0.
	  ○ Core reaching out to at least 10% of r_0.
	  ○ Continuous convection zone of at least 15% of r_0, close to the surface
		variables presented on page 10 in the report line 1, code line 532	5	5

R6	**Report question 6a: Plot main parameters** • Plot m, T, L, ρ, P as requested (normalized to relevant constants and with logarithmic y-scale for ρ and P). ○ Make sure the legends and labels are readable. • Describe the plots in the text. • Comment if something looks unphysical.	plots created by code line 541, explained in report pages 9 and 10	5	5
R7	**Report question 6b: Plot relative energy fluxes** • Plot F_{CON}/F_{TOT} and F_{RAD}/F_{TOT} ($F_{TOT} = F_{CON} + F_{RAD}$). • Describe the plot in the text. • Discuss what the plots mean, e.g. which energy transport mechanism dominates where.	plot created by code line 540, described on pages 9 and 10	5	5
R8	**Report question 6c: Plot relative energy production** • Plot $\varepsilon_X/\varepsilon$ where X is PPI, PPII, PPIII, CNO and ε is the total energy produced at a given r. Include $\varepsilon(r)/\varepsilon_{max}$. • Describe the plot in the text. • Compare it to the temperature plot in project 1 and comment on which chain/cycle dominate at which T.	plot created by code line 539, and explained on pages 9 and 10	5	5
R9	**Report question 6d: Plot temperature gradients** • Plot $\nabla^*, \nabla_{\text{stable}}, \nabla_{\text{ad}}$ with logarithmic y-scale. • Describe the plot in the text. • Discuss the physics of the plot, e.g. where is the plasma convectively unstable?	code line 538, explained on pages 8 and 10 in the report	5	5

#	Requirements	Where is it done?	Score	Max score
R10	**Report question 6e: Plot cross-section** • Plot the cross-section of your best model. • Discuss the plot in the text. • Discuss differences/similarities to the real Sun, e.g. how correct is the width of the core and convection zone. ○ This requires finding relevant number for the real Sun.	code line 537, explained on page 10	4	5
R11	**Report question 7: Report and reflection** • Make a well-written report of max 10 pages, that includes introduction, theory, results, discussion, conclusion, and reflection. ○ The reflection on what you have learned should be a separate section after the conclusion. • Fill in and hand in this check-list with the project.	(everywhere)	15	15
Total score (sum of points)			95	100
Which grade do you think you deserve? (A-F)			B(?)	A

The following is meant for us to evaluate the effect of this self-assessment form:

Has this form given you a better understanding of what was required by the exam?

☒ Yes, a lot	☐ Yes, a little	☐ No	☐ Do not know/wish to answer

Did this form remind you of something you had forgotten to do?

☐ Yes, a lot	☒ Yes, a little	☐ No	☐ Do not know/wish to answer

Did this form make you rethink and change something you had already done?

☐ Yes, a lot	☒ Yes, a little	☐ No	☐ Do not know/wish to answer

Any other comments about either the project or the home exam?

Any other comments about this self-assessment form?

I think it was a great way to overlook my work, and get control over all the contents that was supposed to be included and what I had missed out on. Honestly appreciated