Astronomy 101: Second Midterm Exam Guide
San Diego State University, Prof. Leonard

As indicated in the Course Syllabus, the second midterm exam will be taken in class on Tuesday, November 17. The examination will commence at the start of class, and you will have the full class period (1 hour, 15 minutes) to work on it. It will consist of 50 multiple choice questions.

→ Please see the more general “Midterm Exams Guide” in the Course Reader for general information about preparing for Midterm exams in this class, and for a complete exam study guide. This document will not repeat all of the general information given there, but will instead focus on the specific material relevant to this particular exam.

The exam protocol will be exactly as described in the “Midterm Exams Guide” document: i.e., wait outside the exam room until told to enter as a seating chart will be in effect, and be sure to bring a ParSCORE FORM No. F-289-PAR-L scantron form, a pencil, and one official “exam cheat-sheet” (removed from the back of the Course Reader) with anything you want written inside the box to the exam.

What Should I Study?

Put simply, your second midterm exam explicitly covers all of the information presented since the end of the material covered by your first midterm exam; specifically, it covers the material assigned and described in the Weekly Handouts for weeks 7, 8, 9, 10, and 11 (material up to, but not including, black holes – i.e., the readings from Chapter 15).

One note about the cumulative nature of knowledge gained as this course progresses: While this exam does not explicitly test material that was covered by the first midterm exam (e.g., it will not not contain any questions specifically related to the celestial sphere, retrograde motion, Claudius Ptolemy, etc.), some of the topics presented during weeks 7 → 11 do, by necessity, rely on understanding material presented earlier (e.g., to understand nuclear fusion – a concept presented in week 9 – you must first understand what protons and neutrons are, which was discussed in week 5). In this subtle way, then, the exam is cumulative, although every effort is made to only directly test the later material.

The material that you will want to review for this second midterm, then, is as follows:

1. **Textbook:**
   - Chapter 4: Entire chapter except sections 4.1.4, 4.3.1, 4.4.1, and 4.4.2, which were covered explicitly by your first midterm exam.
   - Chapter 6: Section 6.1.1, 6.1.2 (partial – see Week 8 handout).
   - Chapter 7: Sections 7.1, 7.2, 7.3.1 → 7.3.3, 7.4.2.
   - Chapter 8: Sections 8.4.3 and 8.4.4.
   - Chapter 9: Sections 9.2.1, 9.2.2 and 9.4.4.
   - Chapter 12: Sections 12.4.1 and 12.4.2.
   - Chapter 13: Sections 13.4.3, 13.4.4, 13.5.1 and 13.5.3.
   - Chapter 14: Sections 14.1.1 → 14.1.4, 14.2, 14.3.1, 14.4 and 14.5.

2. **Course Reader:**
   - (a) **Required Reading:**
     - *Light Waves*
     - *Nuclear Interactions*
     - *The Birth and Life of Stars*
   - (b) **Selected Powerpoint Slides:**
     - Slide numbers 143 → 277.
   - (c) **Key Concepts, Terms, People and Ideas:**
     - All terms from “Bright-line (emission-line) spectrum” through “Nova” that are listed on the last pages of the Course Syllabus
(d) **Weekly Assignments:**

Weekly assignments for weeks 7, 8, 9, 10, and 11 (down to, but not including, the reading on black holes in Chapter 15).

3. **On-line reading quizzes:** “Quiz 5”, “Quiz 6”, “Quiz 7”, and “Quiz 8”. Full solutions to all four quizzes\(^1\) are available at the textbook website and on the course homepage. Note that the first 5 questions of “Quiz 9”, which is due the week after the second midterm exam, concern material covered on your exam; thus, you may wish to look them over as well!

**Where Can I go for Help?**

Assistance is available before the exam through:

- *My office hours:* Friday, November 13, from 12:00 – 2:00 PM.

- *TA help room hours* (Rm. 215, physics-astronomy building):
  - Monday: 12 – 1 PM; 5 – 6 PM
  - Tuesday: 5 – 6 PM
  - Wednesday: 12 – 2 PM; 5 – 6 PM
  - Thursday: 2 – 6 PM
  - Friday: 9 – 10 AM; 12 – 2 PM

  → Meeting with *any* of the teaching associates will be helpful. Note, though, that the teaching associates who are specifically associated with my sections of Astronomy 101 are in the Astronomy Help Room at the following times:
  - Shimonee Kadakia: Tuesday 5 – 6 PM and Friday 9 – 10 AM
  - Alex Burke: Friday 1 – 2 PM
  - David Krogsrud: Wednesday 1 – 2 PM and 5 – 6 PM

  Since Shimonee, Alex, and David are part of your course, they may be able to provide more specific guidance than other TAs about things related to this particular section, but you are of course encouraged to go to the Help Room whenever it is convenient for you – most of the other TAs have also been TAs for my sections in the past!

- **Last-minute question-and-answer session.** On Monday, November 16 from 7:00 – 8:30 PM (i.e., the day before your exam) I will hold an extra help session in Rm. 216 of the physics-astronomy building. I will be there to answer any questions that you may have. Note that this is NOT a formal “review session”, and that no additional information about the exam or its contents will be given (since attendance is optional and not all students can make it). Rather, it is provided solely as last-minute help to answer any questions that may have cropped up during your studying – so, come armed with questions!

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\(^1\)Solutions to “Quiz 8” will be available beginning at 12:05 AM, Wednesday November 11, on the textbook website.
Astronomy 101: Midterm Exam #2
November 17, 2009
Professor Douglas Leonard

CLOSED BOOK, NO CALCULATORS

• Print your name and ID number on the SCAN-TRON FORM No. F-289-P AR-L.
• Mark all answers on SCAN-TRON FORM No. F-289-P AR-L. Use a #2 pencil. Completely fill in the appropriate bubble. Be sure to thoroughly erase all altered answers and stray marks! If the SCAN-TRON machine rejects your form for any (valid) reason, you will lose one point (of the 50 that are possible) from your test score.
• For true-false questions: mark bubble A if the statement is true, and bubble B if false.
• For multiple choice questions: mark the bubble corresponding to the single best answer.
• All questions carry equal weight. Read each question very carefully before answering.
• There is no penalty for guessing. Be sure to answer all questions! (Note that the SCAN-TRON machine will reject a form for which an answer is not recorded for every question.)
• Time limit: 75 minutes – budget your time appropriately! Don’t spend too much time agonizing over a tough question. Make a note of it on your exam (you may write in your exam booklet) and return to it after you have finished the others.
• Do not remove this exam booklet from the classroom. Failure to leave your test booklet on your desk will result in receiving a 0% grade for the exam.
• So: No stray marks, one answer per question, answer all questions, and leave the exam booklet on your desk when finished!

DO NOT OPEN THIS EXAM UNTIL TOLD TO DO SO!!

When you are finished, simply place the following THREE things in a stack on your desk:

• Test booklet (TOP of stack)
• Cheat-Sheet (MIDDLE of stack)
• SCAN-TRON (BOTTOM of stack)

GOOD LUCK!!!
Multiple Choice/True-False

Select the best answer for each of the following questions, and indicate your choice by filling in the appropriate bubble on your SCAN-TRON form. Be sure to read all answers before making a selection. For true-false questions, mark bubble A if the statement is true, and bubble B if it is false.

1. Which of the following concerning the Sun is FALSE?
   (a) The Sun is a star, which generates power through nuclear fusion.
   (b) The center of the Sun has a temperature of roughly 15 million degrees Kelvin.
   (c) The Sun is supported against gravitational collapse mainly by the pressure resulting from the thermal motions of gas particles.
   (d) The Sun is about 4.5 billion years old, and will continue fusing hydrogen into helium in its core for another 4 – 5 billion years.
   (e) After hydrogen is exhausted in its core, the Sun will continue to fuse progressively heavier elements all the way up to iron (Fe).

2. Interstellar gas consists primarily of
   (a) iron.
   (b) radioactive argon.
   (c) mercury vapor.
   (d) hydrogen.
   (e) small chunks of rock.

3. Which of the following statements concerning astronomical telescopes is FALSE?
   (a) A telescope is an instrument for collecting light.
   (b) The larger the telescope, the fainter the objects that it can detect.
   (c) Although they hope to do so eventually, astronomers have not yet managed to place a telescope in space, above Earth’s obscuring atmosphere.
   (d) Telescopes now exist that can collect light from the infrared region of the electromagnetic spectrum.
   (e) You can’t fool me; all of the above statements are true.

4. T or F. Over 100 planets have now been discovered orbiting stars other than the Sun.

5. Which of the following evolutionary stages is NOT part of the life of a star that will ultimately explode as a Type II supernova?
   (a) Begins life as a main sequence star with an initial mass greater than about 8$M_{\text{Sun}}$.
   (b) Spends a minimum of 10 billion years fusing hydrogen into helium in its core.
   (c) Evolves to become a supergiant star.
   (d) Rapidly fuses heavier and heavier elements until a core of iron is formed.
   (e) You can’t fool me; all of the above are part of the evolution of a star that ultimately will explode as a Type II supernova.

(Answers – 1: E; 2: D; 3: C; 4: A (True); 5: B.)