Review for Exam 3

First, some information: The test will consist of 40 multiple choice questions. You will have to fill in a scantron sheet with the answers. Use a pencil. Please follow the instructions given on the test carefully.

You will need to know your PeopleSoft number. Please write it down on a piece of paper and bring it to class if you don't have it memorized.

You will not need a calculator. Please do not have one in plain sight during the test. You will be asked to put it away. There are no problems on the test for which you will need a calculator. Equations will be provided, but you should know what the equations mean.

Use my lecture slides, recitation and HW solutions, clicker questions, this review, and the recommended sections of the text book to study.

BELOW IS A SUMMARY OF TOPICS COVERED IN CLASS. IT IS NOT MEANT TO BE A COMPREHENSIVE LIST.

CHAPTER 10:

Low Mass Stellar Evolution (stars like the Sun)

- large interstellar cloud of dust and gas collapses and fragments
- protostar on Hayashi track in HR diagram
- protostar energy from gravity
- What are T-Tauri 'stars'?
- What happens to the Sun after hydrogen gets depleted in core?
- Red giant, helium fusion, hydrogen shell burning
- Planetary nebula, white dwarf - what are these? How large are they?
- Approximate time line of sun evolution

Star Clusters

- Stars of other masses – Hayashi tracks
- What are brown dwarfs?
- Star clusters – OB associations, Open clusters, Globular clusters: compare and contrast properties of open and globular clusters
- Star clusters on the HR diagram – main sequence turn-off is an age indicator

CHAPTER 11:

Massive Star Evolution and explosions

- Novae
- Type Ia Supernovae
- Chandrasekhar limit for a white dwarf (1.4 solar masses)
- Massive star nuclear burning – CNO cycle to get from H He
- Carbon burning at 600 million K
- Successive heavier element fusion – onion-like core structure
- What's special about Iron (Fe)?
- Neutron core formation
- Type II Supernovae
- Type Ia vs. Type II Supernovae – telling them apart
- Supernova remnants – material blown out by a supernova
- Neutron stars – properties, mass limit
- Pulsars
- X-ray bursts
- Gamma ray bursts
- Mass ranges for WD, NS, BH (last slide of chapter)

CHAPTER 12: Black Holes

- Black Holes – masses, radii (Schwarzschild radius, event horizon)
- How do we detect black holes? Examples of 'observed' black holes
- General relativity – what does it describe? What are the tests of general relativity?
- Gravity waves

CHAPTER 13: The Milky Way

- How big is it? Where is the Sun?
- Distance measures:
  - Cepheids and RR Lyrae stars – Period-Luminosity relation
- Galactic structure – what are the components of the Milky Way?
- Compare the Galactic Halo with the Galactic Disk
- Milky Way mass and rotation curve – evidence for dark matter
- Rotation curves of other galaxies – more evidence for dark matter
- Gravitational lenses and cluster velocities – even more evidence for dark matter
- Galactic center – evidence for black hole. Mass of black hole – 4 million solar masses.

Chapter 14: Galaxies

- Classification of galaxies
- Spirals, Barred Spirals, Ellipticals, S0s, Irregulars – properties