Final

You can use any resources, except each other. Please note the exam is due on December 11th at midnight. I can't accept late exams, so turn in your work before the deadline.

1. *(20 points) In under half a page, describe in detail the birth, evolution, and deaths of newly formed celestial matter of mass (a) .001 M_{Sun}, (b) .05 M_{Sun}, (c) .2 M_{Sun}, (d) 6 M_{Sun}, (e) 9 M_{Sun}, (f) 25 M_{Sun}, and (g) 60 M_{Sun}. Your detail should include the nuclear fusion processes and their effect on the star's position in the H-R diagram. Chapter 21-23 notes should help with this, and you should cover the following: giant molecular clouds, protostar, triggered star formation, conservation of angular momentum, brown dwarf, white dwarf, black dwarf, red dwarf, giant, supergiant, neutron star, black hole, zero-age main sequence, proton-proton (pp-)fusion, the triple alpha process, helium flash, planetary nebulae, supernovae, electron degeneracy, neutron degeneracy, star core and shell(s), neutrino. It is not enough to simply discuss the evolutionary path, you should describe why such a path takes place based on the physical processes of each star.*

2. *(8 points) Your friend is skeptical of climate change. He says, "I can prove that climate change isn't real. And whatever effects are perceived as climate change aren't caused by humans. Even if it were real, it's actually not a bad thing! And even if it were a bad thing, it's not worth fixing." Choose four misconception in https://www.skepticalscience.com/argument.php?f=taxonomy, one for each of the categories: It's not happening, It's not us, It's not bad, and It's too hard. Write down this misconception, and correct your friend's misconception, in your own words.*

3. *(8 points) For the units of lightyears (Ly), inches (in), parsecs (pc), kilometers (km), and astronomical units (AU), (a) Define each unit, (b) Convert 1 AU to each unit, and (c) For each item in the list, select which unit is appropriate: (i) distance from Valencia to Main campus, (ii) distance between two stars, (iii) distance between two galaxies, (iv) size of the Milky Way, (v) size of a Milky Way chocolate bar (vi) diameter of a star.*

4. *(9 points) Name a distinct method of measurement for objects that are (a) 15,000 Ly, (b) 200,000 Ly, (c) 1,200,000 Ly, (d) 60,000,000 Ly, (e) 65,000,000 Ly, (f) 90,000,000 Ly, (g) 250,000,000 Ly, (h) 9,000,000,000 Ly, (i) 12,000,000,000 Ly away? Don't repeat the same method of measurement, use a unique method for each distance. The chapters on observing stars and on observing galaxies will help.*

5. *(5 points) Estimate the number of civilizations in the Milky Way outside of our own by coming up with values for the variables of the Drake Equation. Cite and briefly support your values, and calculate the final outcome.*