

ASTRONOMY 2 — Overview of the Universe
Fourth Practice Problem Set

1. True or False: Mark **T** if you believe the statement to be true in its entirety. Mark **F** if any part of the statement is false.

- (1) The type of radiation from a Seyfert galaxy is known as Cosmic Microwave Background Radiation.
- (2) Because the Universe is expanding the distance from here to the sun is, over a period of billions of years, gradually becoming larger.
- (3) A star that is more massive than $50 M_{\odot}$ will end its life in a supernova explosion.
- (4) The ‘proton-proton chain’ describes a series of nuclear fusion reactions that result in the formation of helium.
- (5) The Chandrasekhar limit defines the maximum size (radius) that a red giant star can attain.
- (6) The ‘baryon asymmetry’ of the Universe refers to the fact that the CMBR from one side of the sky is slightly hotter than the CMBR from the opposite side.
- (7) According to the theory of Inflation, the Universe underwent a rapid and drastic expansion during the brief period between the epoch at which the force of gravity developed a unique identity and the epoch at which the strong nuclear force developed a unique identity.
- (8) Interstellar dust grains scatter and absorb starlight, and they do so more efficiently for blue light than for red light.
- (9) The Earth and the other planets in the Solar System are thought to have formed during the White Dwarf phase of the Sun’s evolution.
- (10) Shortly after the Big Bang, there was only one type of force in Nature, instead of the four types of forces we have today: Gravity, Electromagnetism, Strong Nuclear Force, and Weak Nuclear Force.
- (11) Our Galaxy’s measured rotation velocity indicates that it contains a lot of dark matter.
- (12) The discovery of the Cosmic Microwave Background Radiation caused astronomers to propose the Big Bang theory.
- (13) Early on, the Universe was dominated by matter, but now the Universe is dominated by radiation.

- (14) There was a time in the very early Universe when different parts were expanding away from each other faster than the speed of light.
- (15) The “epoch of confinement” is when quarks first combined to form protons and neutrons, and this caused the Universe to become “transparent” to radiation.
- (16) By studying the abundance of light elements that were synthesized in the early Universe, we can determine the amount of baryonic matter in the Universe
- (17) Most of the globular clusters in our Galaxy formed more recently than the Sun.
- (18) Gravity developed a unique identity when the Universe was 10^{-48} seconds old
- (19) The exact details of how matter forms large scale structure in response to gravity depends on whether the dark matter in the Universe is in ‘cold’ or ‘hot’ form
- (20) The distribution of a globular cluster’s stars in an HR diagram can be used to determine its age and distance from us
- (21) The collapse of a dense molecular cloud core into a protostar is often accompanied by a protoplanetary disk and high speed jets