

Quiz 4; Phys 100

Name _____

Classical Gravity: $F = G m_1 m_2 / d^2$. (G is a small constant; you don't need its value.)

1. (3 points) Jupiter is about 300 times more massive than the Earth. But objects on Jupiter's surface weigh only about 3 times as much. Why?

- (a) Magnetic forces on Jupiter counteract gravity
- (b) Electric forces on Jupiter counteract gravity
- (c) The radius of Jupiter is much larger than Earth**
- (d) Jupiter is a gas giant; objects float on the gas
- (e) Earth is much younger than Jupiter

2. (3 points) Will the Earth ever collapse to form a black hole?

- (a) No; it's not massive enough**
- (b) Yes, once the radioactivity of its core is exhausted
- (c) No; it doesn't have enough Hydrogen
- (d) Yes; all rocky planets become black holes
- (e) No; it's too far away from the galactic core

3. (3 points) Why do astronauts in a space station orbiting Earth feel weightless?

- (a) They are too far away to be affected by Earth's gravity
- (b) The space station and astronauts are all in free fall**
- (c) The gravity of the Sun cancels out that of the Earth
- (d) The outward pressure of hot gases prevents gravitational collapse
- (e) The earth is a supernova

4. (3 points) Is there a specific place in the universe where the big bang happened?

- (a) Yes, the solar system
- (b) No, the big bang happened outside our universe
- (c) Yes, in the center of the universe
- (d) No, all of space and time expanded out from the big bang**
- (e) Yes, but we cannot distinguish it from secondary plasmic echoes

5. (4 points) Which of the following is part of an argument that leads us to believe spacetime is curved?

- (a) The gravitational constant G is too small
- (b) Gravitational mass and electrical charge are the same
- (c) Accelerating and non-accelerating frames are indistinguishable
- (d) Light always takes the shortest path**
- (e) Intergalactic space is not empty

6. (4 points) What phenomenon does Neil deGrasse Tyson connect to general relativity?

- (a) Dwarf galaxies
- (b) Galactic collisions
- (c) Galactic clusters
- (d) Quasars
- (e) Gravitational lensing**