

**AST 250 – Spring 2019**  
**Homework Due: Wednesday March 13**

20. (a) Studies of neutron stars indicate that a  $1.4 M_{\text{sun}}$  neutron star has a radius close to 11 km. Assuming the neutron star has a uniform density, how much gravitational potential energy is available to be released by the collapse of the stellar core into a neutron star? Give your answer in ergs or J. Assume the stellar core prior to collapse is much, much larger than the neutron star.
- (b) How close is this neutron star to being a black hole? Quote your answer as a ratio to the Schwarzschild radius.
- (c) How does the average density of this neutron star compare to the density of a carbon nucleus (Carbon nucleus radius  $\sim 3$  fm)?

**Ziggy**

