

PHYS 704 - Test 2.

- 1. [8 points] A current of amplitude 1 A and frequency 100 MHz flows into a center-fed dipole antenna of total length 1 m. **Estimate** the total power radiated (in W) and the radiation resistance of the antenna (in ohms). Note: exact answers are not required, you have been asked to *estimate*. What is the direction of the polarization of the radiation at a point in the plane that bisects the antenna but thousands of lengths away?
- 2. [4 points] Explain, as best as you can, why the sky appears blue and not red.
- 3. [8 points] Draw a spacetime diagram illustrating the twin paradox: Alice travels at $4/5$ the speed of light to a star 8 light-years away, turns around in a short time, and returns at the same speed to earth where she reunites with her twin Alicia. If they were both 20 years old at the time of departure, use spacetime diagram world-lines to find their ages upon reunification. **An explanation of what you are doing, is critical.** *Correct answers not based on a spacetime diagram will not receive significant credit.*