

Review of Exam #2

This will involve concepts discussed in the class notes (including my own additions) as well as the book itself – this will in general be slightly more involved than the notes I handed out in class.

Furthermore, there will be several (~ 10% of exam content by total) questions from the previous exam. The exam will be FULLY essay and math questions, and will involve some thought. Memorization will not be enough.

Basic concepts involve

- 1. familiarity with SI units of energy (Joule), power (Watt), mass (kilogram).**
- 2. familiarity with scientific notation (exponential notation).**
- 3. Questions about signal processing and information.**
 - a. Bandwidth and information transfer rate.**
 - b. Signals and (random, uncorrelated – i.e., “white”) noise.**
 - c. Energies per bit, energy per calculation, and information density.**
- 4. The human brain (read Chapter 8 of LBE somewhat carefully).**
 - a. Architecture of the human brain.**
 - b. The similarities and differences of the human brain from that of modern computers – information processing and storage.**
- 5. SETI**
 - a. Diffraction limits of telescopes (receivers) and transmitters – Fraunhofer diffraction, and the angular resolution of receivers, angular width of transmitter signals at various wavelengths.**
 - b. Why radio astronomy can be done, and why it should be done.**
 - c. Reciprocity theorem – you will have to know about it, not prove it!**
 - d. Important interstellar effects of radio SETI.**
 - e. Optical SETI, and how it differs from radio SETI.**
 - f. Some important optical and radio SETI projects.**

- 6. Discussion of the economics (as basic as possible) of transmitting signals. Do not worry – I will give you a lot of the numbers.**