

UT-Dallas
EE 6328 — Nonlinear Optics
Spring 2001 — Prof. Cantrell
Assignment 1 (due Jan. 25, 2001)

Reading:

1. Govind Agrawal, *Nonlinear Fiber Optics*, Chapters 1–2.
2. Professor Cantrell's [overview of digital communications](#)
3. Professor Cantrell's [notes on the principles of nonlinear fiber optics](#)

Graded Exercises:

1. Agrawal, *Nonlinear Fiber Optics*, Problem 1.1.
2. Agrawal, *Nonlinear Fiber Optics*, Problem 1.2.
3. Agrawal, *Nonlinear Fiber Optics*, Problem 1.3.
4. Agrawal, *Nonlinear Fiber Optics*, Problem 1.4.
5. Agrawal, *Nonlinear Fiber Optics*, Problem 1.5.
6. A fiberoptic communication system operating at a wavelength $\lambda = 1.5 \mu\text{m}$ and at a bit rate of 10 Gb/s receives an average power of -40 dBm at the detector. The transmitted power is 0 dBm. Assuming that 1 and 0 bits are equally likely to occur, that a 0 bit is signaled with zero optical intensity, and that a 1 bit is signaled with constant optical intensity lasting for the entire duration of the bit slot, calculate the number of photons transmitted in each 1 bit, and the number of photons received in each 1 bit.

Self-improvement:

1. Govind Agrawal, *Fiber-Optic Communication Systems*, Chapter 1 and Chapter 2, section 2.3.
2. Thomas E. Stern and Krishna Bala, *Multiwavelength Optical Networks: A Layered Approach*, Chapters 1–2.