CS3235 tutorial questions for the days of (Mon Oct 11-Fri Oct 15, 2004) (Not sure what week...)

October 9, 2004

Hemal and Pradeep will discuss the mid-semester test questions, so if you have any problems/issues please discuss it with them. This may take up 20 minutes to half an hour, so if there is time left...

1. Assuming that the data transferred has maximum entropy, what is the maximum bit transfer rate using 16 level data over a cable with a bandwidth of 1MHz?

2. Assuming that the data transferred has an entropy of 0.2, what is the maximum bit transfer rate using 16 level data over a cable with a bandwidth of 1MHz?

3. Assuming that the signal-to-noise ratio of a communication system is 16:1, what is the maximum bit transfer rate over a cable with a bandwidth of 1MHz?

4. The DES cryptosystem exhibits the *complementation* property, specifically that:

$$\text{if } \mathrm{DES}_k(m) = c \text{ then } \mathrm{DES}_{\bar{k}}(\bar{m}) = \bar{c}$$

(where $\bar{x}$ is the bitwise complement of x). Prove this property.

To prove the property, you must prove that the complementation property holds for any one stage of the Feistel structure.