This is a relatively easy problem sheet, reflecting that the chapter is rather on observations and empirical studies. Use also the time to catch up with previous problem sheets. Good further problems for exam preparation purposes can be found on the course's webpage and at Prof. Cover's webpage. http://www.stanford.edu/class/ee376a/
Ignore problems on material that is not covered in this course...)

Ex. 1
What is the average length of a word in the first order approximation to English if the probability of a space is $p = 0.18$?

Ex. 2
Taking the entropy of English as 1.5 bits, estimate the number of meaningful strings of N symbols in English.

Ex. 3
If you assume $H_E = 1.2$ bits show, assuming the noiseless coding theorem, that 100 letters of ordinary text can be encoded in ~ 25.2 characters of recorded text without loss of information.

Ex. 4
Prove that the average word length in the first-order and second-order approximation to English are the same.

Ex. 5
Two languages obey Zipf's law exactly, but the first has twice as many words as the second. Show that, if q_1 and p_1 are the probabilities of the most frequent words in the two languages, then

$$p_1 \approx \frac{q_1}{1 - q_1 \ln 2}.$$

To be returned in one week, before the lecture.
My web page contains a collection of related material.
http://www.ma.rhul.ac.uk/~elsholtz/WWW/lectures/0506mt441/lecture.html