1. The following is an English sentence encrypted by means of a Vigenere cipher.

PPKVF AZUNG SSHUN KZLQY MUNMH FOWKI ZYNAW HGSAL UB-HWK VVBOY TVJOH APLJR LGIGY TLUGB YAUAP LCRZY CQULO UL-MAO CSANU VLWAT SWHHC LFOVA QZMIK YAFLA LLVLX VKJBV LYVPE TSQCY RWION HBZNA TZOTK JYCDN YTJLM UCGTU TKJLP XILLD TVOIU WOIMK EMKNH LUTTP KZQIA BTJYM HNIUU NGUKV ONAYR VOIAQ AZWOO WMACT PPETH BOYRA BAPJW TJESF IPNEV HTOYB CABSY OMNHG ZBYCK LLSYP BOFIC YRRVW SMFLL NCULV NOYLE UAWTU KLXEE PAPPE JINVY QIOTP INUHV KMEAO PEOMS MEHMW KU

Find the Vigenere keyword (which need not be an English word) and find the plaintext.

2. Let $H(x) = -x \log_2(x) - (1 - x) \log_2(1 - x)$ $(0 < x < 1)$.
(a) Show that $H(x)$ attains a maximum when $x = 1/2$.
(b) Interpret part (a) in terms of the uncertainty in tossing a (possibly biased) coin.

3. The accuracy of a certain radio station's meteorologist at predicting rain is given by the following chart.

	Actual rain	Actual no rain
Predicts rain	1/12	1/6
Predicts no rain	1/12	2/3

For example, 1/12 of the time the meteorologist predicts rain when in fact it does rain. Notice that the meteorologist is correct 3/4 of the time. An uninformed listener observes that he could be correct 5/6 of the time by simply always predicting no rain. He applies for the meteorologist's job. However the station manager declines to hire the listener. Why?
[Hint: Does the listener provide more or less information?]

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