# THE XXI INTERNATIONAL MATHEMATICAL OLYMPIAD
## LONDON 1979

PROBLEMS PROPOSED BY FINLAND.

SF1 Show that for no integers $a \geq 1$, $n \geq 1$ is the sum

$$1 + \frac{1}{1+a} + \frac{1}{1+2a} + \dots + \frac{1}{1+na}$$

an integer.

SF2 For $k = 1, 2, \dots$ consider the k-tuples $(a_1, a_2, \dots, a_k)$ of positive integers such that

$$a_1 + 2a_2 + \dots + ka_k = 1979.$$

Show that there are as many such k-tuples with k odd as there are with k even.

SF3 Show that for any vectors $\bar{a}$, $\bar{b}$

$$|\bar{a} \times \bar{b}|^3 \leq \frac{3\sqrt{3}}{8} |\bar{a}|^2 |\bar{b}|^2 |\bar{a} - \bar{b}|^2 .$$