where

$$\langle \alpha_k, \phi(t) \rangle = \sum_{j=1}^{n} \bar{\alpha}_j^k \phi_j(t), \qquad \|\alpha_k\|^2 = \sum_{j=1}^{n} |\alpha_j^k|^2.$$

If $E = \bigcap_{k=1}^{\infty} E_k$, then E consists of those $t \in [0, 1]$ for which

$$|\langle \alpha_k, \phi(t) \rangle| \leqq K\|\alpha_k\|, \qquad k = 1, 2, \cdots.$$

Using the density of the α_k this means that $t \in E$ if and only if

$$(*) \qquad \|\phi(t)\|^2 = \sum_{j=1}^{n} |\phi_j(t)|^2 \leqq K^2.$$

Now for each fixed k the vector $\sum_{j=1}^{n} \bar{\alpha}_j^k \phi_j$ belongs to M and hence for almost all $t \in [0, 1]$ we have

$$\left| \sum_{j=1}^{n} \bar{\alpha}_j^k \phi_j(t) \right|^2 \leqq K^2 \left\| \sum_{j=1}^{n} \bar{\alpha}_j^k \phi_j \right\|_2^2 = K^2 \cdot \sum_{j=1}^{n} |\alpha_j^k|^2.$$

Thus the sets E_k have measure 1 and consequently $m(E) = 1$, i.e., (*) holds for almost all t. Hence

$$n = \sum_{k=1}^{n} \|\phi_k\|_2^2 = \sum_{k=1}^{n} \int_0^1 |\phi_k(t)|^2 dt \leqq K^2 \cdot 1.$$

Also solved by Harry Furstenberg and Charles McCarthy, M. A. Malik, M. Rajagopalan and A. Wilansky, and the proposer.

Notes. See also S. Banach, *Theorie des Opérations Linéaires*, pp. 203–204 for the application of lacunary trigonometric series above.

The proposer settles the case $p < \infty$ with the closed subspaces generated by the Rademacher functions; see Zygmund, *Trigonometric Series*, 1st ed., pp. 122, ff.

Furstenberg shows that M (in L^∞) is contained in the eigenspace of a Hilbert-Schmidt operator on L^2 (0, 1) corresponding to the eigenvalue 1 and is, therefore, finite dimensional. He observes, too, that a closed subspace of l^2 consisting of sequences in l^1 is finite dimensional.

A New Method of Catching a Lion

In this note a definitive procedure will be provided for catching a lion in a desert (see [1]).

Let Q be the operator that encloses a word in quotation marks. Its square Q^2 encloses a word in double quotes. The operator clearly satisfies the law of indices, $Q^m Q^n = Q^{m+n}$. Write down the word 'lion,' without quotation marks. Apply to it the operator Q^{-1}. Then a lion will appear on the page. It is advisable to enclose the page in a cage before applying the operator.

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1. H. Petard, A contribution to the mathematical theory of big game hunting, this MONTHLY 45 (1938) 446–447.