BIG GAME HUNTING FOR GRADUATE STUDENTS IN MATHEMATICS

JAYADEV ATHREYA AND APOORVA KHARE

Abstract. Considerable work has been done in the last century on catching lions ([1]-[7]) using various techniques from mathematics and other natural sciences. We present a few techniques from basic areas of mathematics that are also accessible to graduate students. We would like to dedicate this manuscript to Hector Pétard, and his wife Betti Pétard (née Bourbaki).

0.1. The Stochastic Method. We observe that lions are not elephants; therefore they are forgetful and memoriless. Thus they satisfy the Markov property (see [10]). Limiting ourselves to males, if necessary, we observe that they are clearly irreducible and aperiodic. Hence they converge to a stationary distribution. The capture of a stationary lion is left as an exercise to the neophyte.

0.2. Algebraic Geometry - I. Clearly, a sick lion is easily captured. A healthy lion is a fine lion. But we know that affine lines have no sense of direction or origin; hence they are easily captured as well. For references for this solution and the next, see [9].

0.3. Algebraic Geometry - II. One notes that a lion is a mammal (in particular, a lion is neither a fish nor a reptile). Thus it does not possess scales. But a scaling invariant lion is projective. By earlier results one has tame lions. Twist one of them, and place it over our projective lion; one thus gets a twisted lion bundle, and the desired lion is entangled.

0.4. Lie Theory - I. One notes that lions occur in groups - namely, Lieo groups. These can move about the Sahara desert, thus acting on it transitively. Since the Sahara desert is clearly a manifold, it is a homogeneous space. Thus every point has a stabilizer subgroup, that is, each lion in the subgroup stabilizes the point. A lion that stays at this point may be easily captured by the neophyte (as above). For this and the next part, a somewhat useful reference is [8].

Key words and phrases. Lion, Sahara, desert.
0.5. **Lie Theory - II.** We observe that catching lions is either easy or not. If it is easy, we leave the problem to the reader; for now, we assume that the situation is complexified.

We consider the Sahara desert representation of the lions, all of whom are loyal to their pride; this is representing their group rather simply. It is thus a simple, faithful representation of the Lie group.

However, we also observe (cf. National Geographic) that lions commute with each other. Thus this Lie group is abelian, and hence has only one-dimensional characters.

In the proud representation considered above, the character given by intelligence, would then be a power of the pride character. Since pride is not powerful enough to yield any intelligence, lions are stupid. To capture a stupid lion is easy.

### References


Dept. of Mathematics, University of Chicago, Chicago, IL 60637, U.S.A.