PROBLEM 4001: A large nation, of
whom we will only concern ourselves with
adult males, N in number, and who each bear
separate surnames colonise a district. Their
law of population is such that, in each genera-
tion, a_0 per cent of the adult males have no
male children who reach adult life; a_1 have
one such male child; a_2 have two; and so on
up to a_5 who have five.
Find (1) what proportion of their surnames
will have become extinct after r generations;
and (2) how many instances there will be of
the surname being held by m persons.