

Answer all questions. Some questions may require you to consult other sources: if so, remember to reference the sources used in standard style (see the Department's web page on "Plagiarism and Collusion" for instructions on referencing). Always use your own words, unless there is justification for a brief direct quote—if there is, use quotation marks. This exercise counts 5% towards your total module mark.

1. Explain briefly why the Steady State model of cosmology expects that the slope of the $\log N - \log S$ plot should be $-3/2$, and why the observed slope is more of a problem for the Steady State than for the Big Bang (even though for the same assumptions the Big Bang naturally predicts an even less steep slope). [Note that Sciama uses the standard radio astronomy notation in which flux is denoted by S . N in this relation is the number of sources with observed flux $\geq S$.] [3]
2. Sciama corrects the extragalactic source numbers by a "red shift factor". What is the cause of this factor, and what is its effect on the slope of the $\log N - \log S$ relation? [2]
3. Sciama assumes that both the "true" N_e and his assumed Galactic population N_g fall off as $S^{-3/2}$ (plot the numbers in Table I if you doubt this). Therefore his model source numbers fail to describe the data, as can be seen from the last column in Table I. How does he account for the discrepancy? Why does he argue that this explanation is more plausible in his model than the similar explanation suggested in his references 4-6? [4]
4. The observed distribution of radio sources at the time was fairly isotropic (as it still is). Sciama does not assume that his Galactic sources are in the halo, so one would expect that they would be preferentially located at low Galactic latitude. Explain why Sciama is satisfied that his model is not ruled out by the distribution of sources as then known. [3]
5. What tests does Sciama suggest for his model? Explain in each case how the test constrains the hypothesis. [3]