

General relativity problem sheet 9

This counts as five questions for credit purposes. The marking scheme is as follows: 28% of the marks for each of the three tests, plus 16% of the marks for style. Some essay questions ask for “at least three topics” and in those cases more than three topics may receive credit, to a maximum of 28% per topic and 84% for all topics.

Explain **three** of the following tests of the theory of general relativity. Your explanations should be brief and clear statements of the theoretical results, of the relevant observational results and of what fundamental aspects, if any, of the theory are corroborated by the observations. Details of mathematical deduction and observational technique are not required.

- (a) Bending of light by the gravitational field of a star.
- (b) Gravitational red shift.
- (c) Precession of the perihelion of one body orbiting about another.
- (d) Gravitational waves.
- (e) Black holes.

In addition to lecture notes, you may want to use relevant parts of

<http://math.ucr.edu/home/baez/RelWWW.old/tests.html>

<http://relativity.livingreviews.org/Articles/lrr-2006-3/index.html>