Homework problems set 2, FYTN08, vt15

The exercises for this week (due Friday 24 April, 10.15) are:

1. Exercises 5.7 page 139 and 5.12 page 140.

2. Exercise 5.21 page 140-141. If time at the end of the course permits I will use this space-time to explain some of the principles behind Hawking radiation at the end of the course. Try to think a little bit about horizons and this accelerated observer for those who have encountered horizons before. This space time also allows to think about the equivalence principle and uniform gravitational fields.

3. Exercise 6.28 and 6.29 page 169, but also show that in two dimensions the Riemann tensor has only one independent component.

4. Exercises 6.34 page 169.


Hints and comments

5.12 It is sufficient to work out $p_{rr}$ and $p_{r\theta}$.

6.28(a) It is sufficient to do it for $g_{rr}$, $g_{r\phi}$ and $g_{\phi\phi}$.

6.29 Hint: It is easier to work out $R^{\alpha\beta\mu\nu}$. Also remember that the metric is diagonal, so many terms are immediately zero.

6.13 and 6.14 Hint: these exercises have only very simple calculations but are there to understand the principles involved.

Sources of lecture notes

A course with similar content as this one has lecture notes which may be useful, but beware of occasional differences in notation:

http://www2.warwick.ac.uk/fac/sci/physics/current/teach/module_home/px436/notes

Googling any of the subjects you have problems with typically throws up a lot of links, but the quality varies very much. If you find a good one, let me know and I add it to the course webpage.