Homework 3

Problem 1: Do problem page 84.

Problem 2: Show that the Linsted-Poincaré method is a special case of the Lighthill method by expressing the coefficient-functions $\omega_i(\tau)$ of the latter in terms of the scalar coefficients $\omega_i$ of the former.

Problem 3: Do problem 2 part 3 (iii) page 97.

For extra practice: Do problem 2 parts 1 and 2 (i and ii) page 97.

Problem 4: Using one of the various methods of strained coordinates learned in lectures, find a uniformly valid 1-term expansion of the solution (i.e. with a 2-term expansion for the strained coordinate):

- $f'' + \left(2 - \frac{1}{\sqrt{1+\epsilon f^2}}\right) f = 0$, with $f(0) = 1$ and $f'(0) = 0$.
- $f'' + f + (e^{\epsilon f} - 1) = 0$, with $f(0) = 1$, and $f'(0) = 0$.

Problem 5: Read the note on the failure of renormalization page 96, and do problem 4 page 97.