Problem 1. 2004.2.1

Find all real values of x that satisfy:

(i) $\sqrt{3x^2+1}+\sqrt{x}-2x-1=0$

(ii) $\sqrt{3x^2+1}-2\sqrt{x}+x-1=0$

(iii) $\sqrt{3x^2+1}-2\sqrt{x}-x+1=0$

Prerequisites.

You will need to have a good standard of GCSE algebra. You will also need to be able to use the Factor Theorem to factorise polynomials and then be able to carry out algebraic long division. These topics are usually taught in the first A'Level module. The Factor Theorem is reviewed in Chapter 7.

First Thoughts.

None of it looks complicated. There will be a need to square both sides of an equation in order to get rid of the root signs. In fact this will need to be done twice.