Physics with neutrons 1

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Exercise sheet 5
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Exercise 5.1

Calculate and draw the coherent and incoherent differential scattering cross section from scattering at two nuclei with scattering lengths b_1 and b_2 and a distance of R.
How does the coherent cross section evolve with an increasing number of nuclei with equal distances placed along a line?

Exercise 5.2

A 2-dimensional hexagonal lattice with lattice constant a is given in the normal space. Draw the corresponding lattice in reciprocal space. How are the reciprocal lattice vectors determined? What does the first Brillouin zone look like?

Exercise 5.3

Calculate the total coherent and incoherent scattering cross sections of SiO_2.
Hint: You can look up neutron scattering lengths and cross sections at
`http://www.ncnr.nist.gov/resources/n-lengths/`.