Written assignment 2. Due Wednesday September 30.

Let S be a set in $\mathbb{R}^n$, as in Section 10.1. Also as in 10.1, we say that a set is *closed* if its complement S^c is open.

Recall also that the set S is called *open* if every point of this set has a neighbourhood (that is, an open ball centred at that point), which is contained in S. This is the same as saying that every point of S is an interior point.

Let ∂S denote the set of the boundary points of S.

Problems:

(1) Using these definitions, prove that S is a closed set if and only if $S \supseteq \partial S$.

(2) Is the complement of the x-axis in $\mathbb{R}^2$ an open subset? (Include proof).

(3) (Problem 11 from 10.4) Give a condition on the position vectors of four points in $\mathbb{R}^3$ that guarantees that these four points lie in the same plane. Prove that your condition is necessary and sufficient.