Problem Sheet 3.3: Confluence and normal forms

Exercise 1: A **combinator** is any lambda term which does not contain any free variables, usually denoted with upper case letters. The combinators S , K and I are defined to be the following λ -terms:

$$\begin{aligned} S &= \lambda xyz.xz(yz) \\ K &= \lambda xy.x \\ I &= \lambda x.x \end{aligned}$$

Reduce the following terms to normal form:

a) SKK

b) SIK

c) SSS

Exercise 2: Let W be the term:

$$\lambda x.\lambda y.xyy.$$

a) Reduce the term WW to normal form.

b) Give a complete analysis of the sequences of beta-reductions that the term WWW can perform.