Q 1. (40%)

In the following, you are required to give the lambda term that needs to replace ? so that the reduction results as given. Note that the given expressions are meant to be lambda terms rather than syntactic objects.

(a) $?\,a\,b = b\,a$

(b) $?\,a\,b\,c = a\,c\,b$

(c) $?\,a\,b\,c = a\,(c\,b)$

(d) $?\,a\,b = \lambda x.a\,x\,(b\,x)$

(e) $?\,(\lambda x.a\,x)c = ac$

(f) $?\,(\lambda x.a\,x)c = \lambda y.a(yc)$

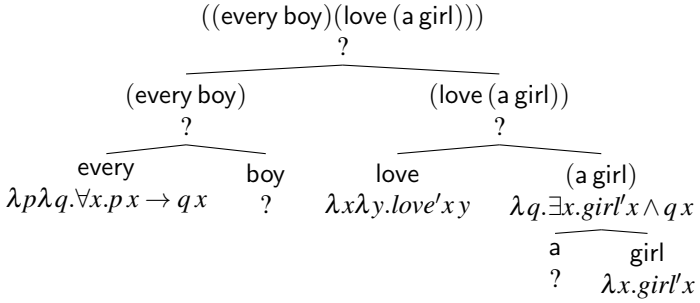
(g) $?\,(\lambda x.sleeps'\,x) = sleeps'\,john'$

(h) $?\,sleeps' = sleeps'\,john'$

Q 2. (60%)

Complete the missing entries in the following trees:

(a) Every boy loves a girl.



(b) Every boy walks or talks.