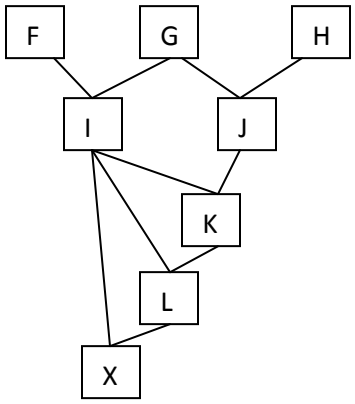
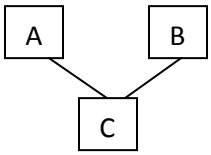
BIOE 440/BIOE 521: Conservation Biology
Fall 2013, HW5, Inbreeding

NAME_____

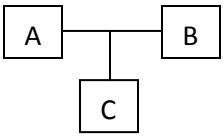
1. This pedigree comes from Giraffe X at the Paris zoo. Its wild caught ancestors were all captured in Nigeria.
   (a) What is the inbreeding coefficient, *F*, for Giraffe X?
   (b) Explain any assumption you made in calculating the inbreeding coefficient that would affect its value.



Note:



is the same as



but allows a pedigree to be shown more clearly in cases where some individuals mate with more than one relative (like giraffe I does)

2. The table below shows 300 genotypes observed at a single locus, for endangered mice in two locations (X and Y) that are close to one another but separated by a 2-lane highway. Each of the two locations also contains plowed fields that are a potential barrier to movement within the location. We are interested in knowing if human activities are leading to a reduction in heterozygosity, compared to the heterozygosity that would be expected if mice move freely across plowed areas and roads to mate at random.

	Frequency of Genotypes		
	AA	Aa	aa
Location X	50	100	50
Location Y	14	12	74

   (a) What is the observed heterozygosity for each location? Averaged across both locations?
   (b) What is the expected heterozygosity for each location if mating is random within the location? Averaged across both locations?
   (c) What is the expected heterozygosity if mating is random across the two locations as a single breeding population?
   (d) Use the heterozygosities to calculate F_{IS}, F_{ST} and F_{IT}.
   (e) Interpret the data: overall, is heterozygosity lower than expected with random mating? Explain why.