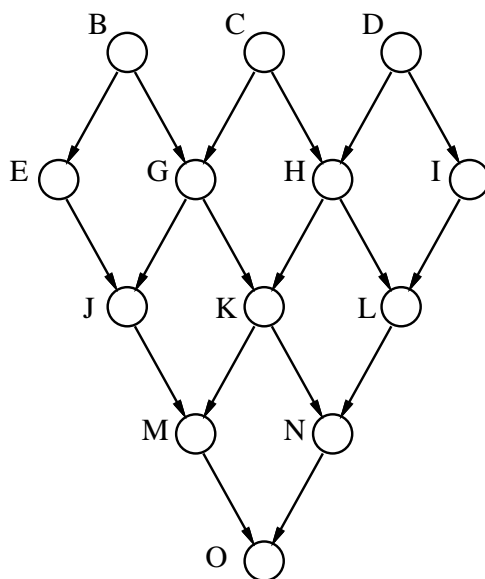


Homework 7
due Wednesday February 15, 2017

Do these problems, and email the results (if you can, in a PDF or else in Word .DOC or .DOCX format. PDF is best as I cannot read some .docx files. From recent versions of Microsoft Word you can save to PDF format using the Save As menu item.) Like all of the weekly homeworks this one totals 25 points and is due at the end of that day (at midnight).

- (12 points) What is the inbreeding coefficient (probability of identity by descent) of individual O in this pedigree? Show all loops and how much IBD they each contribute.



- (13 points) Two diploid populations of 100 individuals each reproduce separately for 10 generations. At the end of that time, they are combined with each other into a population of 200 individuals. From then on they mate as one random-mating population (of size 200) for another 10 generations, ending up as generation 20. Considering the starting generation as the base generation (in which all gene copies have no identity by descent) compute the expected identity by descent of a randomly chosen pair of copies in the final generation. How to do it:
 - In each of the two populations, compute the expected identity by descent of a random pair of copies in the 10th generation in one of the populations, just before the populations merge.
 - Consider what would be the IBD at that time for a gene from one of those populations and a gene from the other one.
 - For the generation in which the populations have been combined, figure out for two copies randomly drawn from it, what the probabilities are for both coming from population #1, for both coming from population #2, and for one coming from each (the probabilities of these possible events have to add up to 1). Then use these as the weights to make a weighted average of the probability of identity by descent.
 - From that it should be easy to figure out what the probability of IBD in each of the next 10 generations.

You don't have to show me all these steps, but if you do, it will make it easy for me to give you partial credit if something goes wrong.