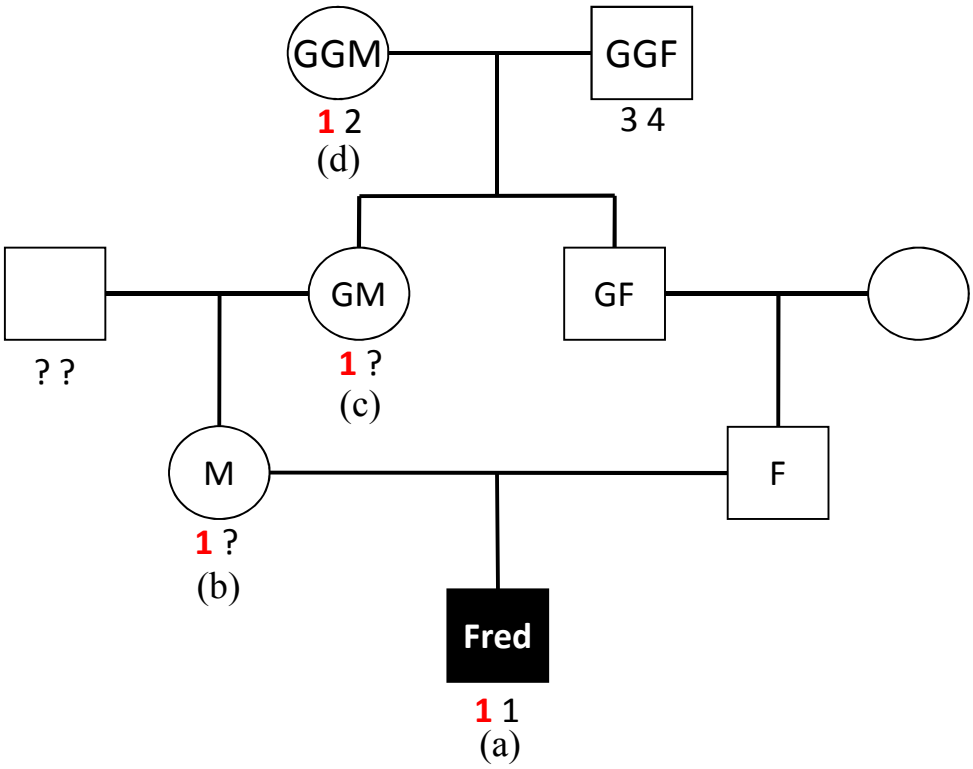

Understanding the calculation of inbreeding coefficient (*F*) from a pedigree

F is the probability of autozygosity, *i.e.*, that an individual has two alleles that are identical by descent. Let us then label the great-grandparents' alleles 1, 2, 3, and 4. For Fred to have two copies of allele 1 (a), he must have inherited one copy from his mother with a probability of ½ (b). His mother, in turn, must have inherited a copy from her mother (GM), with a probability of ½ (c). The grandmother must have inherited allele 1 from her mother (GGM) with a probability of ½ (d). In addition, Fred must have inherited his other copy of allele 1 from his father (F, ½) through his grandfather (GF, ½), and again ultimately from his great-grandmother (GGM, ½). Compounded together, *f* for allele 1 is $(½)^6$. But Fred could also be autozygous for his great-grandmother's allele 2, so the probability of being autozygous from the great-grandmother (GGM) is $2 \times (½)^6 = (½)^5$. The same calculations apply to the probability of being autozygous for alleles 3 or 4, inherited from the great-grandfather (GGF), which further doubles the overall probability another two fold. The outcome is as calculated in class: $(½)^4$. The protocol consisting of counting the number of intervening individuals, including the common ancestor(s), is simply a trick that produces the same result.