STATS 700-002 Class 2.
The coalescent

Edward Ionides and Aaron King

September 4, 2025

The coalescent

Kingman, J. F. C. (1982). The coalescent. *Stochastic Processes and their Applications*, 13(3), 235-248. https://doi.org/10.1016/0304-4149(82)90011-4.

Section 1

- How does the construction of section 1 relate to a genealogical tree?
- What does the assumption (1.3) mean?
- Is the relation $\prec$ defined in (1.4) an order relation?
- Verify that $q_\xi = \binom{|\xi|}{2}$, as claimed in (1.6).
- In terms of genealogical trees, what is the interpretation of the D_t process introduced in (1.8)?
- In terms of genealogical trees, what does the *transit time* T introduced in (1.11) correspond to?

Theorem 1

- What do we have to know about continuous time Markov chains to follow this proof?
- Why does equation (2.1) hold?
- Verify equation (2.2).

Theorems 3 and 4

- Summarize, in words, what is accomplished by these results.

Relevance to phylodynamics

- It may be hard at this point to see the relevance of Kingman's coalescent to practical phylodynamic inference.
- Given what we know at this point, conjecture how Kingman's coalescent might be used, or extended to be useful.