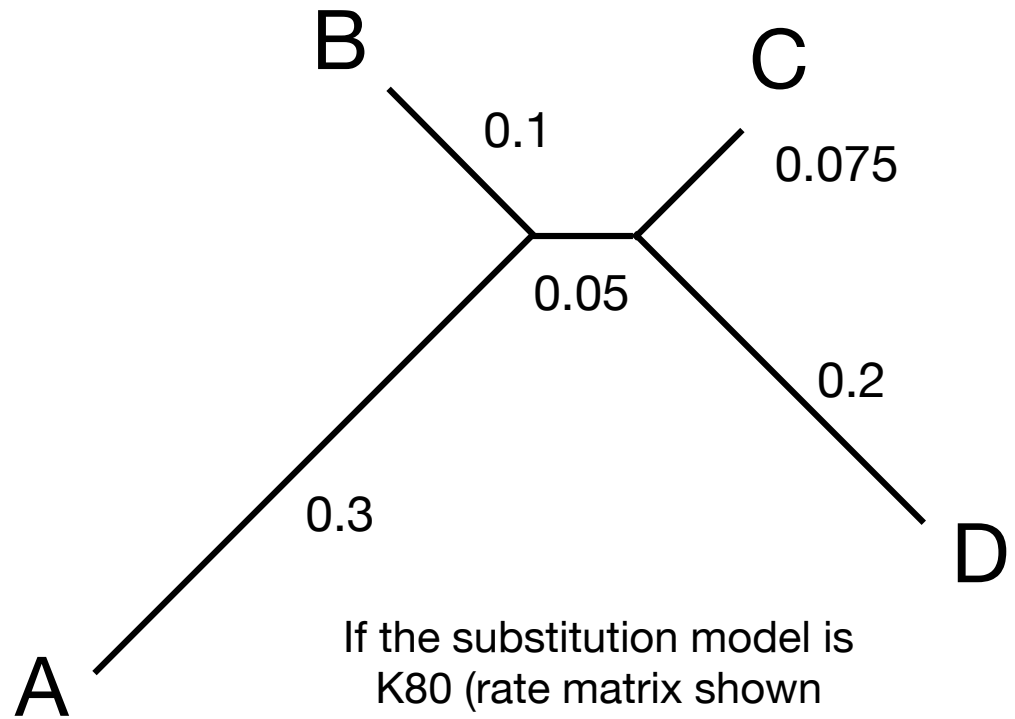


Homework 4

One parameter of every substitution model is obtained from the edge length; other parameters are global

The edge lengths on this unrooted tree are in units of expected number of substitutions/site



If the substitution model is K80 (rate matrix shown below), and kappa = 5, what is the value of beta*t for each edge (to 5 decimal places)?

edge length	beta*t
0.05	0.00714
0.075	
0.1	
0.2	
0.3	

$$\begin{matrix} & \text{A} & \text{C} & \text{G} & \text{T} \\ \text{A} & \left(\begin{array}{cccc} -\beta(\kappa + 2) & \beta & \beta\kappa & \beta \\ \beta & -\beta(\kappa + 2) & \beta & \beta\kappa \\ \beta\kappa & \beta & -\beta(\kappa + 2) & \beta \\ \beta & \beta\kappa & \beta & -\beta(\kappa + 2) \end{array} \right) & & & \\ \text{C} & & & & \\ \text{G} & & & & \\ \text{T} & & & & \end{matrix}$$

How many *transitions* do you expect over the entire tree per site? _____

How many *transversions* do you expect over the entire tree per site? _____

(hint: the above two numbers should add up to the tree length)