Homework #5

- Assume the **JC69 model** and that **all edges have length 0.38311922** expected substitutions per site.
- **Compute the transition probabilities probsame and probdiff** and **write the values in the spaces provided** (probsame is the transition probability when the same base is observed at both ends of an edge, probdiff is the transition probability when different bases are observed across an edge).
- **Compute the likelihood for each of the 16 combinations** and **write it on the appropriate tree** in the next slide (use **7 decimal places**). **Place tick marks on edges** in which a change occurs (the number of tick marks will equal `ndiff` below).
- Finally, **sum these 16 values** to obtain the overall site likelihood and write that in the space provided (again, use 7 decimal places).
- Note that I'm asking for likelihood, **not** log(likelihood)
- Below is a Python template for calculating one of the 16 values:

```
from math import log,exp,pow
nsame = 3.
ndiff = 2.
probsame = # replace with number or formula
probdiff = # replace this number or formula
loglike = log(0.25) + nsame*log(probsame) + ndiff*log(probdiff)
like = exp(loglike)
print(like)
```

I've done the 1st and 3rd of the 16 ancestral state combinations, so use those results to make sure your program works correctly. After that, you only need to change nsame and ndiff to do the others. Note that you really only have to calculate 4 values because many ancestral state combinations have the same nsame and ndiff.

Homework #5 worksheet

Overall likelihood: _____

probsame: _____ probdiff: _____