Your Name:

1.

Please find the COI (Cytochrome C Oxidase I) gene of *Odontobutis potamophilius* through GenBank, and retrieve sequences of COI gene for all genera of the Odontobutidae (keep one sequence for each genus). In addition, you should also download a sequence of an outgroup species. Download and install MEGA (http://www.megasoftware.net) on you computer. Use MEGA to **align** the sequences, do a **model test** and **reconstruct the phylogeny** using ML method and the model suggested by ModelTest with 500 **bootstrap** replicates.

a) Which taxon should you use as the outgroup to root the tree?

b) Please list here the best model suggested by ModelTest.

c) Insert the image of the resulting phylogeny with bootstrap values here as well.

2.

a) In molecular evolution modeling, what does i.i.d. stand for?

b) Please describe three situations when the i.i.d assumption does not hold.

c) Provide solutions to those cases that you pointed out when the i.i.d assumptions were violated, i.e. how to relax the basic model or include new parameters.