1. Draw the approach trajectory, the transition state and the Diels-Alder product for the following two diene/dienophile combinations (assume they obey the *endo* rule). *NB*. The second reaction is the first step in an Overman synthesis of racemic pumiliotoxin C.

![Diels-Alder reactions](attachment:image.png)

2. The molecule below was synthesized from a heterocycle, a diene and a disubstituted alkyne in three steps including a selective reduction. Perform a retrosynthetic analysis on the target molecule and hence deduce the synthetic route used:

![Target molecule](attachment:image.png)

3. Predict the products of the following reactions:

![Reactions](attachment:image.png)