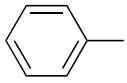
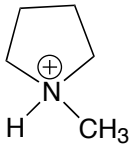
3. (16 pts) Complete the following reactions:

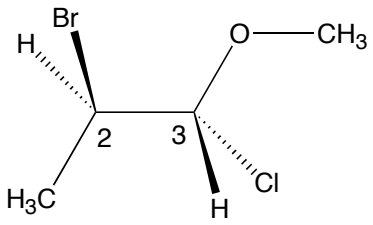
a) $H_3CCH_2C{\equiv}CH + NaNH_2 \longrightarrow$

b)  $+ CH_3CH_2OLi \longrightarrow$

c)  $+ CH_3ONa \longrightarrow$

d)  $+ HBr \longrightarrow$

4. (10 pts) Draw the perspective below in an equivalent **Newman**, sighting down C-2, C-3 (C-2 in **front**).



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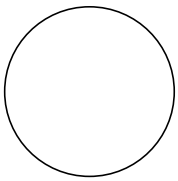
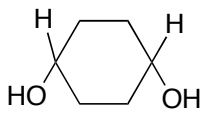


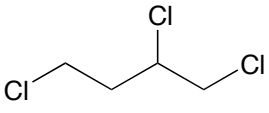
5. (4 pts) Circle all those below that can react as nucleophiles.

$CH_3O^{\ominus}$ PH_3 Cu^{2+} $B(CH_3)_3$

6. (10 pts) Indicate the total number of signals you expect to see in the NMR for the compounds below, based upon the concept of chemical equivalency.

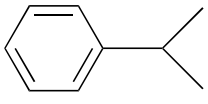


^{13}C _____



^{13}C _____

^{1}H _____



^{13}C _____

^{1}H _____