1) Provide a complete and correct **synthesis** of the molecule below using molecules containing **three** carbons or fewer. (5 points)

\[ \text{CH}_3\text{CuLi} \]

\[ \text{Br} \]

\[ \text{HBr} \]

\[ \text{Li/NH}_3 \]

1) NaNH\(_2\)

2) CH\(_3\)CH\(_2\)Br

2) Provide the major **product(s)** for the reactions below. (3 points)

\[ \text{NH}_2 \rightarrow \text{NaSH} \rightarrow \text{DMF} \rightarrow \text{NR} \]

\[ \text{OTs} \rightarrow \text{CsBr} \rightarrow \text{CH}_3\text{OH} \rightarrow \text{NR} \]

\[ \text{Br} \rightarrow \text{NaCN} \rightarrow \text{acetone} \rightarrow \text{CN} \]

3) Rank the following in order of **SN1** reactivity. (1 = most reactive). (1 point)

**a)** substrate

1. secondary benzylic, best leaving group

2. secondary, ok leaving group

3. secondary, best leaving group

5,000,000 F\(-\) is NOT a leaving group

**b)** solvent

2. polar, but aprotic

50. non-polar

1. polar, protic