Practice Problems for Chapters 7 and 8. To be completed after completion of the problems in the text.

1) Draw structures for the two products and explain how they are formed. How might you enhance the yield of B?

\[
\begin{align*}
\text{Br} & \quad + \quad \text{S}^- \quad \rightarrow \quad \text{S} \quad \text{S}^- \\
\text{Br} & \quad + \quad \text{S}^- \\
& \quad \rightarrow \quad \text{C}_4\text{H}_8\text{S}_2 \quad \text{A} \\
& \quad + \quad \text{C}_6\text{H}_{12}\text{S}_2\text{Br}_2 \quad \text{B}
\end{align*}
\]

2) Devise S\text{N}2 reactions that would give the following products starting with your choice of alky halides.

\[
\begin{align*}
\text{N}_3 & \quad \text{CN} \\
\text{Br} & \quad \text{NaN}_3, \text{DMSO} \\
\text{Cl} & \quad \text{NaCN, DMSO} \\
\text{OH} & \quad \text{NaH}
\end{align*}
\]

3) Predict the major substitution product of the following reactions and determine if they are formed from S\text{N}1 or S\text{N}2 pathways.

\[
\begin{align*}
\text{N} & \quad + \quad \text{I} \\
& \quad \text{Acetone} \\
\text{Br} & \quad + \quad \text{I}^- \\
& \quad \text{HMPA} \\
\text{H}_3\text{C} & \quad + \quad \text{H}_2\text{O} \\
& \quad \text{Acetonitrile} \\
\text{Br} & \quad + \quad \text{H}_2\text{O} \\
& \quad \text{EtOH} \quad \text{MeOH}
\end{align*}
\]
4) For the following dibromo alkane determine which position will react faster (be more reactive) under $S_N1$ and $S_N2$ conditions. Explain your answer.

$\text{Br} \quad \text{Br}$

$3^\circ$ fastest under $S_N1$ because carbocation
$1^\circ$ fastest under $S_N2$ because unhindered

5) Predict the major elimination product of the following reactions and indicate if they are from E1 or E2 pathways.

6) Predict the major product in each of the following reactions and indicate if it came from an $S_N1$, $S_N2$, E1, or E2 reaction.
7) For each of the following reactions, provide the appropriate reagents or products in the boxes provided.

8) Answer the following questions for the reaction coordinate diagram shown below.

A. Give the letter(s) corresponding to the transition state(s). ___B,D____

B. Give the letter(s) corresponding to the reactive intermediate(s). ___C____

C. **Step 1** or **Step 2** is the rate determining step. (circle one)

D. Step 1 is **endothermic** or **exothermic**. (circle one)

E. Step 2 is **endothermic** or **exothermic**. (circle one)

F. The overall reaction is **endothermic** or **exothermic**. (circle one)