Name:

1. Circle the major product for the following  $S_N2$  reaction. (1 point)

2. Circle the major product for the following **E1 reaction**. (1 point)

a. b. c. d. 
$$\begin{array}{c} CI CH_3 \\ H_3C_{\prime\prime\prime} \\ \hline \end{array}$$
 heat 
$$\begin{array}{c} H_3C_{\prime\prime\prime} \\ \hline \end{array}$$
 heat 
$$\begin{array}{c} H_3C_{\prime\prime\prime} \\ \hline \end{array}$$

- 3. a. Use a Newman projection to predict the major **E2 elimination** product for the following reaction.
  - b. Provide an arrow pushing mechanism to account for your predicted product. (4 points)

- 4. a. Provide a mechanism to account for the following  $S_N1$  reaction.
  - b. Use this mechanism to briefly explain why this reaction produces a racemic (±) mixture of products. (4 points)

$$H_3C$$
 $CH_3$ 
 $H_2O$ 
 $H_3C$ 
 $CH_3$ 
 $H_3C$ 
 $CH_3$