Write all answers on these pages. Do not use red ink. Students may request that exams be regraded by submitting to Dr. Sommer a typewritten note stating the nature of the dispute no later than two weeks after taking the exam. Only exams taken in ink (not ink over pencil), on which no correction fluid has been applied and on which there are at least four points in dispute are accepted for regrading. The entire exam is regraded.

Name __________________________________________________________________

ID Number __________________________________________________________________

Discussion __________________________________________________________________

I II III IV V VI VII VIII
H Li Be B C N O F Ne
Na Mg Al Si P S Cl Ar
K Ca Ga Ge As Se Br Kr
Rb Sr In Sn Sb Te I Xe

Do not write in this space.

Page 1__________/018
Page 2__________/022
Page 3__________/022
Page 4
Page 5__________/022
Page 6__________/016
TOTAL__________/100
1. [24] Draw the structure of the major product of these reactions; the formula of the product is supplied as a hint. Clearly indicate the stereochemistry of the product of those reactions marked §; do not write mechanisms.

a. \( \text{Hg(OOCCH}_3\text{)}_2 \text{CH}_3\text{CN solvent} \)

b. § \( \text{IBr} \)

c. \( \text{HCl (1 eq.)} \)

d. \( \text{HCl (40 °C)} \)

e. § \( \text{BH}_3 \)

f. 1-propyne \( \text{(1) NaH} \)
2. [16] Write the systematic name of these compounds.

a. 

b. 

c. 

d. 

(1 eq.)
Show how 1-bromo-1-methylcyclohexane can be efficiently converted to these compounds; any other reagent may be used. Draw the structure of the compound formed after each synthetic operation; do not write mechanisms.

a  [14]  

b  [10]
4. In the boxes on the following two pages write reasonable, detailed electron-pushing mechanisms for these reactions.

a. \[ \text{[12]} \]

b. \[ \text{[10]} \]

Note: \(^{18}\text{O}\) denotes oxygen-18, a rare (0.2% abundant) isotope of oxygen.

c. \[ \text{[8]} \]

d. \[ \text{[8]} \]
1. [24] Draw the structure of the major product of these reactions; the formula of the product is supplied as a hint. Clearly indicate the stereochemistry of the product of those reactions marked §; do not write mechanisms.

(a) [Diagram]

(b) §

(c) [Diagram]

(d) [Diagram]

(e) §

(f) [Diagram]
2. Write the systematic name of these compounds.

a. \(\text{3,6-dimethyl-5-cyclohexene-1,2,4-trione}\)

b. \(\text{4-(1-butynyl)-4-methylcyclooctanecarbaldehyde}\)

c. \(\text{2-(4-hydroxy-1-oxopentyl)pentanedial}\)

d. \(\text{3-(2-oxoethyl)benzenecarbaldehyde}\)
Show how 1-bromo-1-methylcyclohexane can be efficiently converted to these compounds; any other reagent may be used. Draw the structure of the compound formed after each synthetic operation; do not write mechanisms.

a  
\[
\text{Br} \xrightarrow{\text{base}} \text{CHO} \quad \xrightarrow{\text{O}_3} \quad \xrightarrow{\text{Zn}} \quad \xrightarrow{\text{H}^+} \quad \text{target}
\]

b  
\[
\text{Br} \xrightarrow{\text{LDA}} \xrightarrow{\text{RCO}_3\text{H}} \xrightarrow{\text{CH}_3\text{CCNa}} \xrightarrow{\text{H}_2\text{O}} \xrightarrow{\text{H}_2} \text{target}
\]
4c

\[ \text{Product} \]

4d

\[ \text{Products} \]