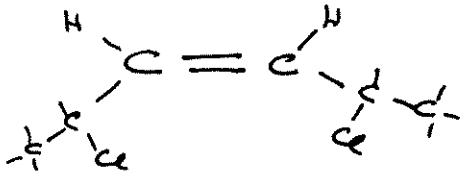
**CHEM-1110 TEST # 1 FEB. 28,2002 NAME:**_____

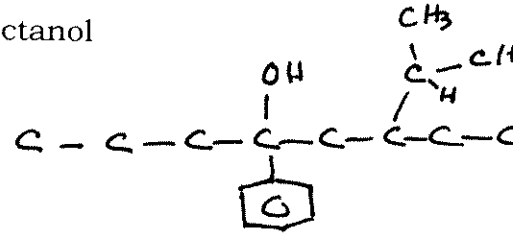
**PLEASE BE VERY NEAT. MESSY WORK WILL BE IGNORED.**

**1.** Draw structres for the following. Show all bonds on carbon atoms.

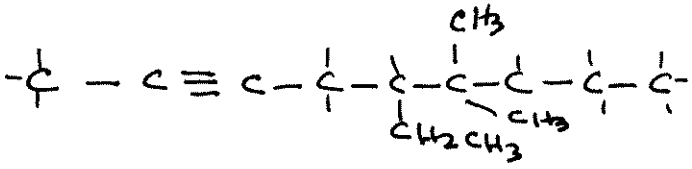
a) cis-2,5-dichloro-3-hexene



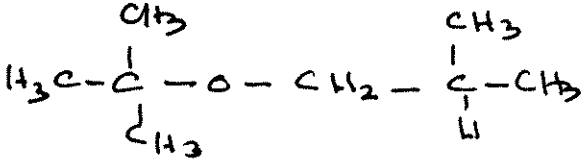
b) 4-phenyl-6-isopropyl-4-octanol
0r 4-phenyl-6-(1-methylethyl)-4-octanol



c) 5-ethyl-6,6-dimethyl-2-nonyne

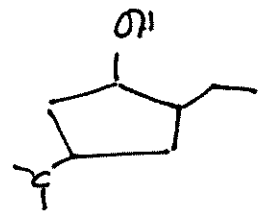


d) tert-butyl isobutyl ether
or 1,1-dimethylethyl 2-methylpropyl ether

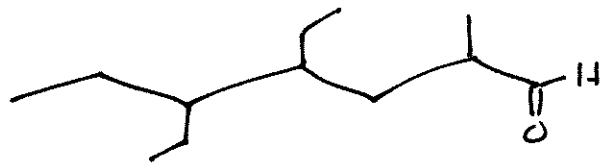


e) p-bromophenol

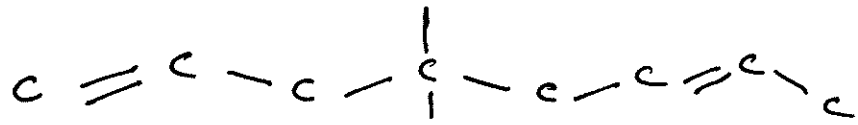
f) 2-ethyl-4-isopropylcyclopentanol



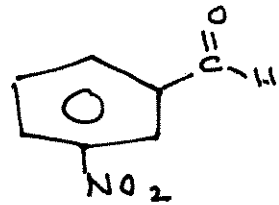
g)4,5-diethyl-2-methylheptanal



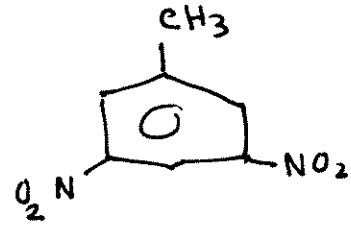
h) 4,4-dimethyl-1,6-octadiene



i) m-nitrobenzaldehyde



j) 3,5-dinitromethylbenzene



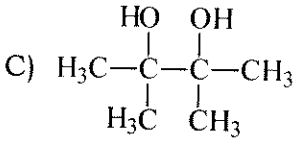
**2.** Name the following, using IUPAC or other reasonably acceptable names.

a) $CH_3CH_2CH_2\overset{\overset{O}{\|}}{C}OCH(CH_3)_2$

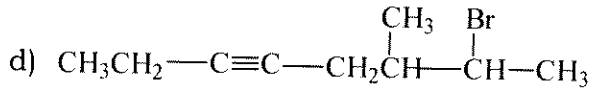
ISOPROPYL BUTANOATE
OR 1-METHYLETHYL BUTANOAT

b) $ClCH_2CH_2CH_2CH_2\overset{\overset{O}{\|}}{C}—OH$

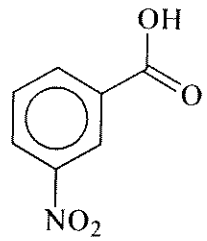
5-CHLOROPENTANOIC ACID

C) 

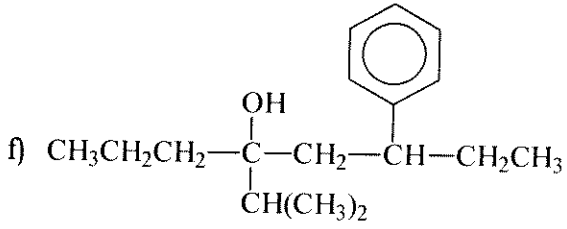
2, 3-DIMETHYL-2,3-BUTANEDIOL

d) 

7-BROMO-6-METHYL-3-OCTYNE

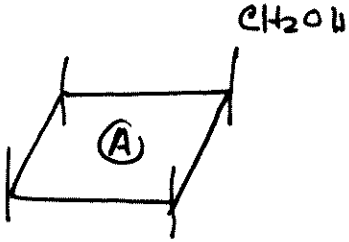
e) 

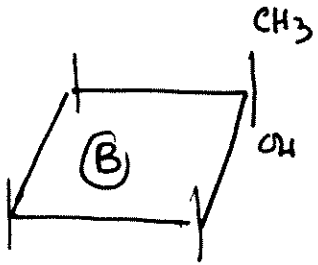
3-NITROBENZOIC ACID

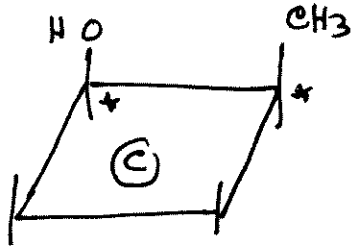
f) 

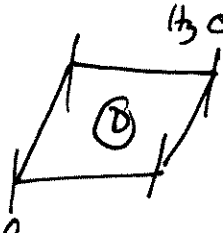
4-ISOPROPYL-6-PHENYL-4-OCTANOL

**3.** a) Draw the structures for the **4** structural isomers of $C_5H_{10}O$ that contain a **four-membered** cyclic ring and an **alcohol.** Label your structures using letters or numbers.



b) Indicate which of the **4** structural isomers can have geometric (cis-trans) isomers.

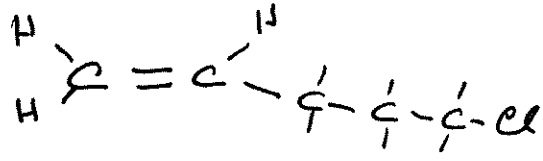
C and D

c) Indicate which of the **4** structural isomers can have optical isomers and label all **chiral** carbon atoms with an asterisk.

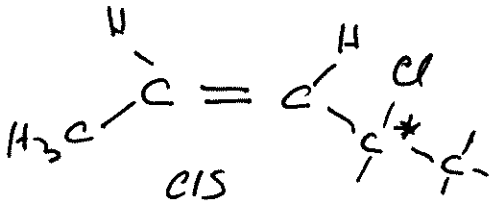
C

**4.** Draw the structural formula for an unsaturated alkyl chloride of molecular formula $C_5H_9Cl$ that shows

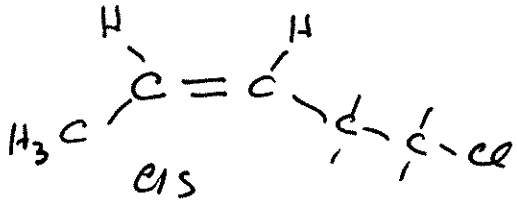
a) neither geometric nor optical isomers.



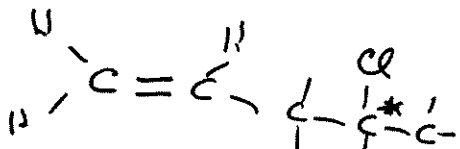
b) both geometric and optical isomers. Mark chiral C with a *.



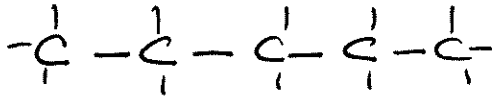

c) geometric but not optical isomers.




d) optical but not geometric isomers. Mark chiral C with a star.

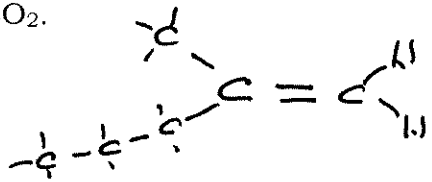


**5.** Write the structure of an alkane, MM=72, that would yield three monochloro derivatives on chlorination.



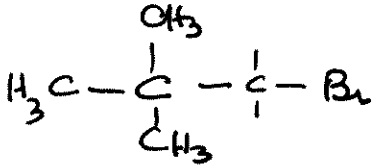
1- CHLORO , 2-CHLORO , 3- CHLORO

**6.** Write the structure of an alkene that on oxidation with hot and conc. $KMnO_4$ would yield 2-pentanone and $CO_2$.

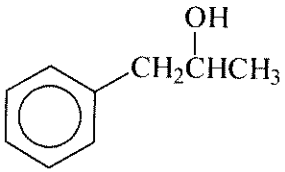


**7.** Draw the structure(s) for the main organic product(s)for the following reactions.

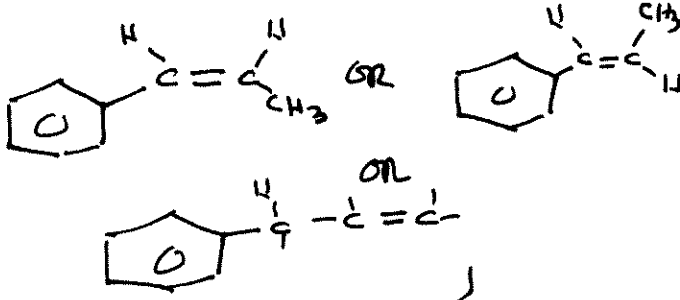
a) $(CH_3)_4C$ + $Br_2$ (1 mol) $\xrightarrow[\text{light}]{\text{heat or}}$



b)

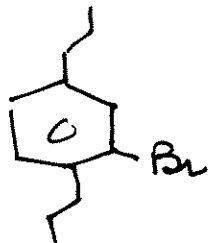


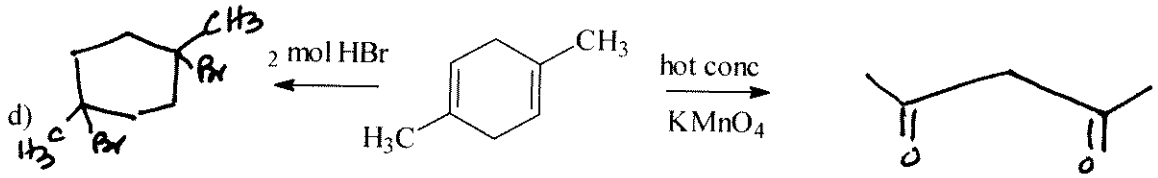
$\xrightarrow[\text{heat}]{\text{conc } H_2SO_4}$



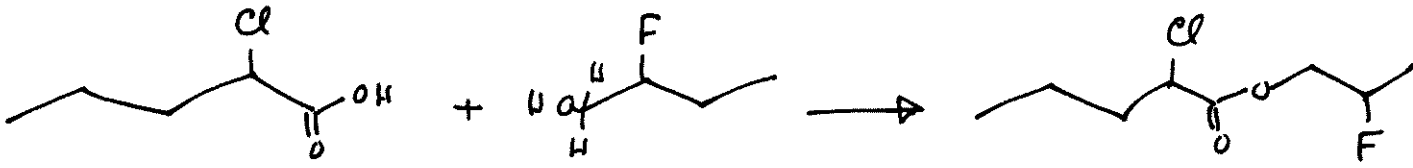
c)

$\xleftarrow[KMnO_4]{\text{hot conc}}$ 1,4-dipropylbenzene + $Br_2$ $\xrightarrow{FeBr_3}$

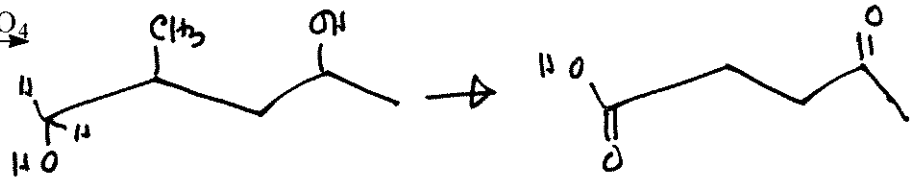


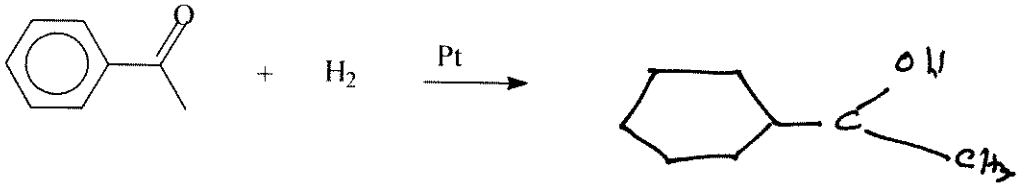
d) 


e) 2-chloropentanoic acid + 2-fluoro-1-butanol $\xrightarrow{H^+}$



f) 2-methyl-1,4-pentanediol $\xrightarrow{KMnO_4}$

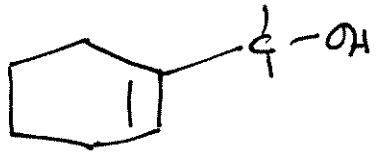


g) 

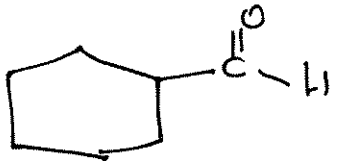

**8.** Using the formula $C_7H_{12}O$, provide structures to satisfy each of the following requirements:

Many answers.

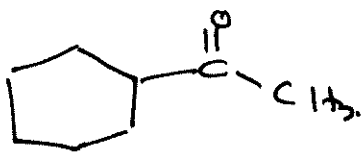
a) a compound which will react with both Na and $H_2$/Pt.



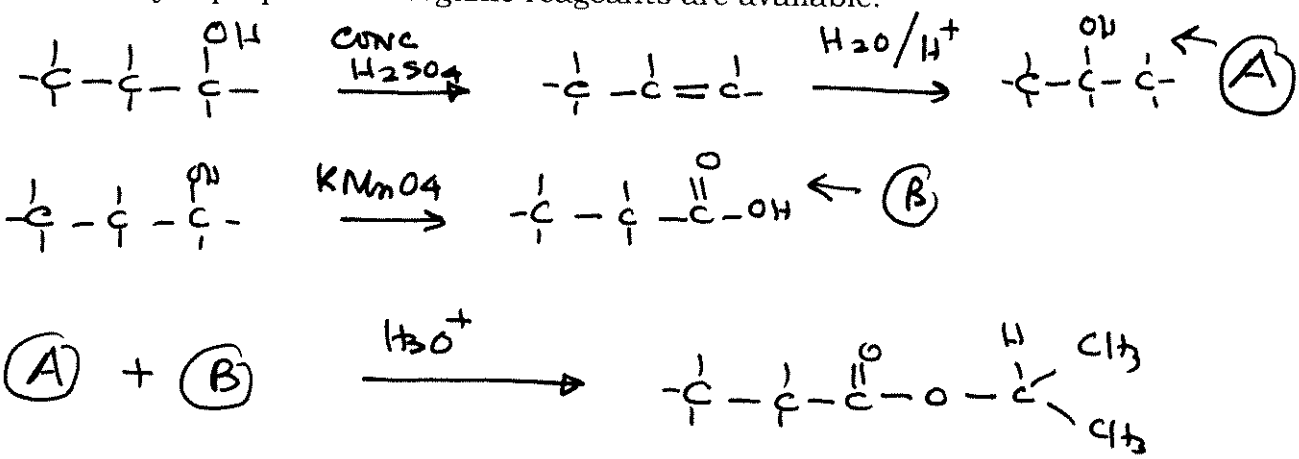
b) a compound which will react with $KMnO_4$ but not Na



c) a compound which will react with $H_2/Pt$ but not $KMnO_4$



**9.** How would you prepare isopropyl propanoate (1-methylethyl propanoate) starting with only 1-propanol? Inorganic reageants are available.




**10.** In the dichlorination of propane four products with the formula $C_3H_6Cl_2$ were isolated and labeled **A**, **B**,**C**, and **D**. Each was separated and further chlorinated to give one or more trichlorinated propanes, $C_3H_5Cl_3$. **A** and **B** gave three, **C** gave one, and **D** gave two. Give the structures for **C** and **D**. One of the products from **A** was identical with the product from **C**. Give the structure for **A** and **B**.