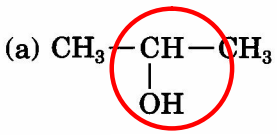
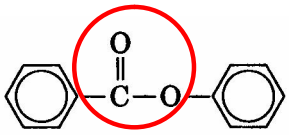
REVIEW QUESTIONS
Chapter 19

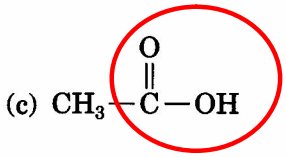
1. Circle and identify each functional group in the structures below:

(a) 

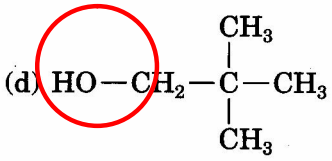
Alcohol

(b) 

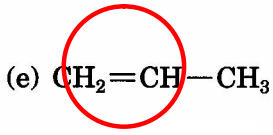
Ester

(c) 

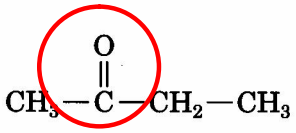
Acid

(d) 

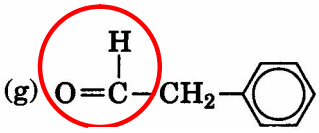
Alcohol

(e) 

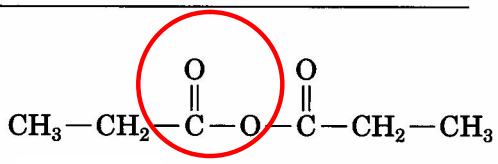
Alkene

(f) 

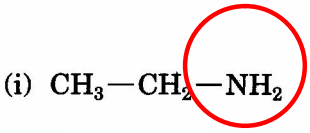
Ketone

(g) 

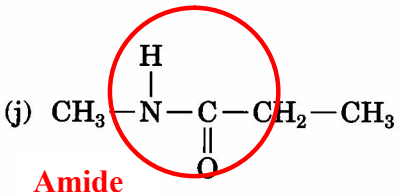
Aldehyde

(h) 

Ester

(i) 

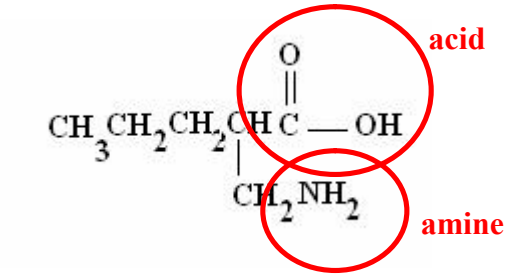
Amine

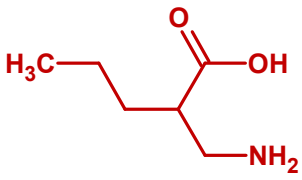
(j) 

Amide

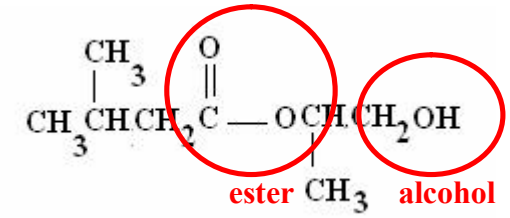
2. Identify the functional groups and draw stick diagrams for each structural formula shown below:

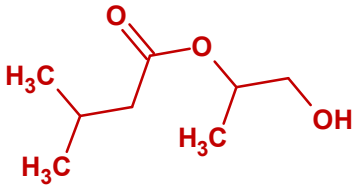
a)





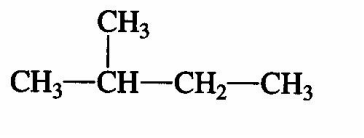
b)





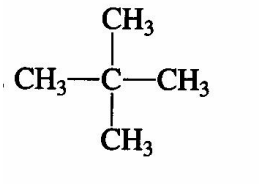
3. Name each of the following alkanes using the IUPAC system:

a)



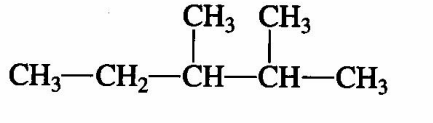
2-methylbutane

b)



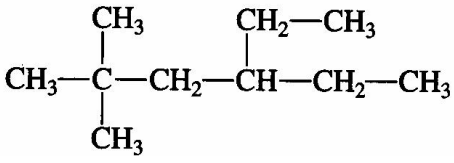
2,2-dimethylpropane

c)



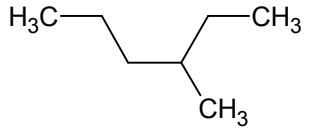
2,3-dimethylpentane

d)



4-ethyl-2,2-dimethylhexane

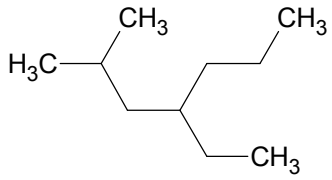
4. For each stick diagram shown below, write condensed structural and molecular formulas and name using the IUPAC system:

a) 

Molecular formula: C_7H_{16}

Structural formula: $CH_3CH_2CH_2CH(CH_3)CH_2CH_3$

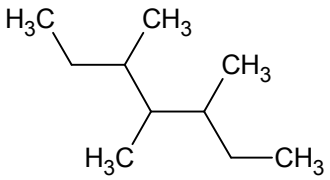
Name: **3-methylhexane**

b) 

Molecular formula: $C_{10}H_{22}$

Structural formula: $CH_3CH(CH_3)CH_2CH(CH_2CH_3)CH_2CH_2CH_3$

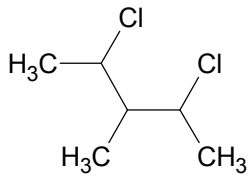
Name: **4-ethyl-2-methylheptane**

c) 

Molecular formula: $C_{10}H_{22}$

Structural formula: $CH_3CH_2CH(CH_3)CH(CH_3)CH(CH_3)CH_2CH_3$

Name: **3,4,5-trimethylheptane**

d) 

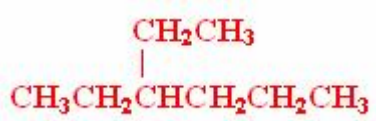
Molecular formula: $C_6H_{12}Cl_2$

Structural formula: $CH_3CH(Cl)CH(Cl)CH(CH_3)CH_3$

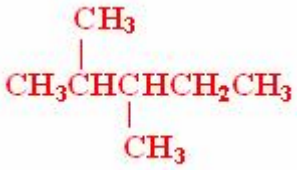
Name: **2,4-dichloro-3-methylpentane**

5. Write the condensed structure for each of the following:

a) 3-ethylhexane



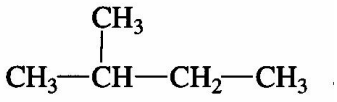
b) 2,3-dimethylpentane



c) 1,3-dichloro-3-methylpentane

6. For each hydrocarbon shown below, identify carbons and hydrogens as primary (1°), secondary (2°) or tertiary (3°).

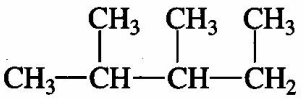
a)



1°C: 3 # 2°C: 1 # 3°C: 1

1°H: 9 # 2°H: 2 # 3°H: 1

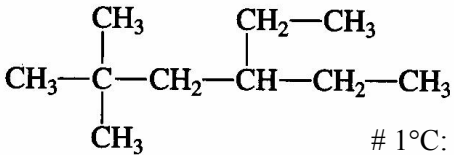
b)



1°C: 4 # 2°C: 1 # 3°C: 2

1°H: 12 # 2°H: 2 # 3°H: 2

c)



1°C: 5 # 2°C: 3 # 3°C: 1

1°H: 15 # 2°H: 6 # 3°H: 1

7. Complete each of the reactions shown below. If reactions produce more than one isomer, draw structure and name each isomer.

a) $CH_3CH_2CH_2CH_2CH_3 + Br_2 \xrightarrow{h\upsilon}$ (all mono-brominated products)

$CH_3CH_2CH_2CH_2CH_2Br$ — **1-bromopentane**

+

2-bromopentane

+

3-bromopentane

b) $CH_3CH_2CH_2CH_2CH_3 \xrightarrow{\Delta}$ **$CH_3CH_2CH_2CH{=}CH_2$**

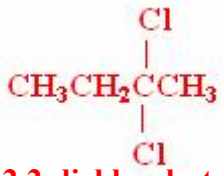
+

$CH_3CH_2CH{=}CHCH_3$

c) $CH_3CH_2CH_2CH_3 + Cl_2$ (excess) $\xrightarrow{h\upsilon}$ (all di-chlorinated products)

$CH_3CH_2CH_2CHCl_2$

1,1-dichlorobutane



2,2-dichlorobutane

2,3-dichlorobutane

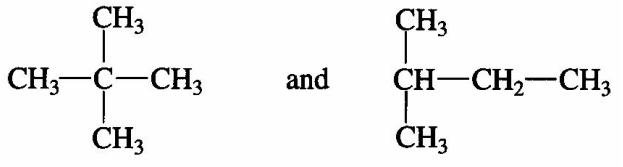
1,2-dichlorobutane

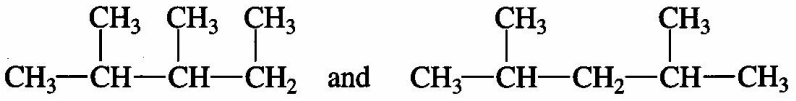
1,3-dichlorobutane

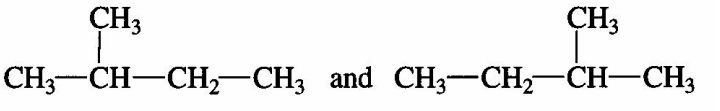
$ClCH_2CH_2CH_2CH_2Cl$

1,4-dichlorobutane

8. Indicate whether each of the following pairs of structural formulas represent isomers or the same molecule:

a)  and **Isomers**

b)  **Isomers**

c)  **Same molecule**