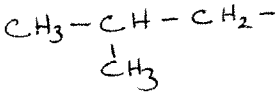
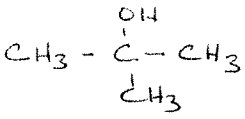
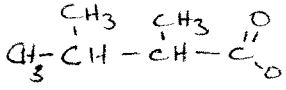
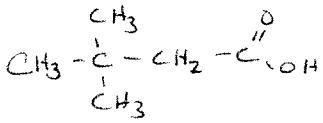
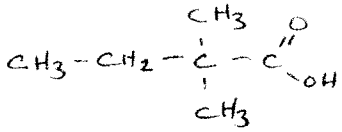
Ch 12 whst. #3

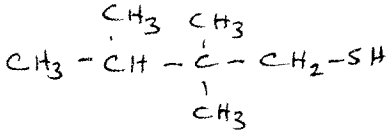
Answer Key

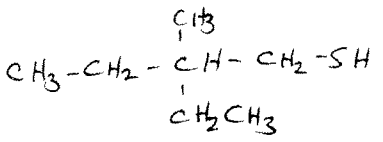
1. a)  2-methyl-1-propanol

 2-methyl-2-propanol

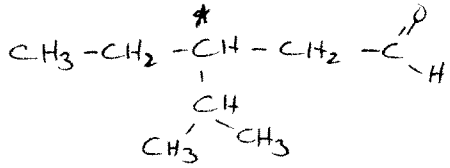
b)  2,3-dimethylbutanoic acid 

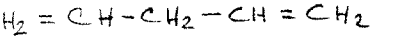
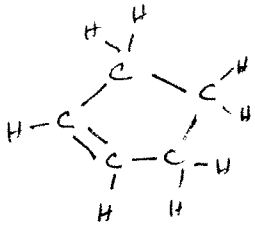
 2,2-dimethylbutanoic acid 3,3-dimethylbutanoic acid

c)  2,2,3-trimethyl-1-butanethiol (2,3,3-trimethylbutanethiol,

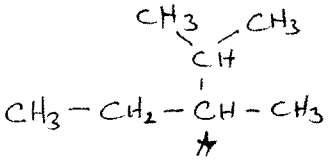
 2-ethyl-2-methyl-1-butanethiol

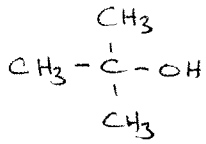
- change -SH position

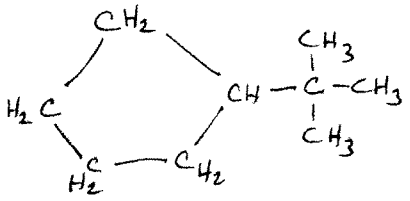
d)  2-isopropylpentanal *-chiral

e)  1,4-pentadiene  cyclopentene

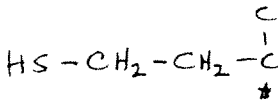
- two degrees of unsaturation

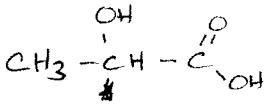
2. a)  2,3-dimethyl pentane *-chiral

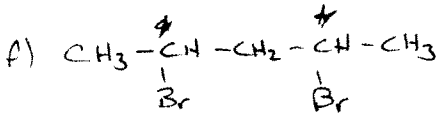
b)  2-methyl-2-propanol

c)  tert-butylcyclopentane

- no cis
- default for single substituent is #1
- not chiral

d)  4-mercapto-2-methyl(-1-butanol -* chiral

e)  2-hydroxypropanoic acid (lactic acid) *-chiral

f)  2,4-dibromopentane *-chiral

3a) 2-methylbutane < pentane < heptane

b) 2,2-dimethylbutane < 2-methylpentane < hexane

c) methane < chloromethane < dichloromethane

d) 2-methylpropane < butane < butanol

4a) $2\ C_4H_{10(g)} + 13\ O_{2(g)} \longrightarrow 8\ CO_{2(g)} + 10\ H_2O_{(g)}$

b) $C_3H_{8(g)} + 4\ O_{2(g)} \longrightarrow CO_{2(g)} + 2\ CO_{(g)} + 4\ H_2O_{(g)}$

c) $C_4H_{10(g)} + Br_{2(l)} \xrightarrow{h\nu} C_4H_9Br + HBr_{(g)}$

d) $CH_3CH_2CH_2CH_2Br$ $CH_3CH_2CHBrCH_3$

1-bromobutane 2-bromobutane

e) 2-bromobutane

5 a) $CH_{4(g)} + 3\,Cl_{2(g)} \longrightarrow CHCl_{3(l)} + 3\,HCl_{(g)}$

$$1\,L\,CH_4 \;\|\; \frac{26.5\,g\,CHCl_3}{} \;\Big|\; \frac{1\,mol\,CHCl_3}{119.37\,g} \;\Big|\; \frac{1\,mol\,CH_4}{1\,mol\,CHCl_3} \;\Big|\; \frac{22.4\,L\,CH_4}{1\,mol\,CH_4} = \boxed{4.97\,L\,CH_4}$$

b) $CH_{4(g)} + 3Cl_{2(g)} \longrightarrow CHCl_{3(l)} + 3HCl_{(g)}$

initiation: $Cl_2 \xrightarrow{h\nu} 2Cl\cdot$

elongation (propagation):

$CH_4 + Cl\cdot \rightarrow CH_3\cdot + HCl$

$CH_3\cdot + Cl_2 \rightarrow CH_3Cl + Cl\cdot$

$CH_3Cl + Cl\cdot \rightarrow \cdot CH_2Cl + HCl$

$\cdot CH_2Cl + Cl_2 \rightarrow CH_2Cl_2 + Cl\cdot$

$Cl\cdot + CH_2Cl_2 \rightarrow \cdot CHCl_2 + HCl$

$\cdot CHCl_2 + Cl_2 \rightarrow CHCl_3 + Cl\cdot$

termination:

$Cl\cdot + Cl\cdot \rightarrow Cl_2$

or $\alpha\cdot + CH_3\cdot \rightarrow CH_3Cl$