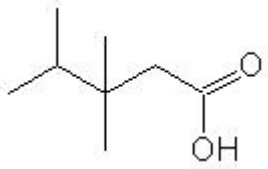
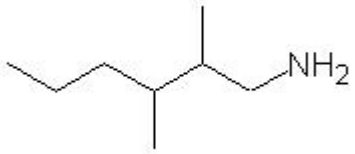
Name: _____ Class: _____ Date: _____

1. Give the IUPAC name of the following molecules

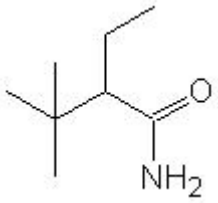
(a)



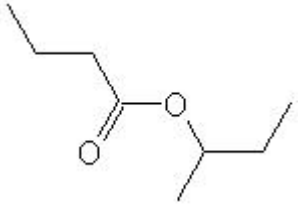
(b)



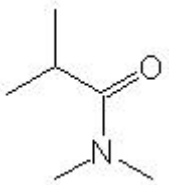
(c)



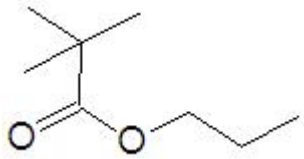
(d)



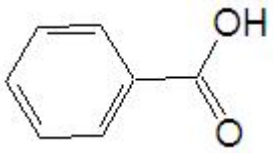
(e)



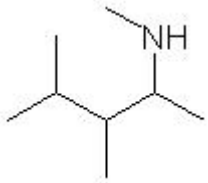
(f)



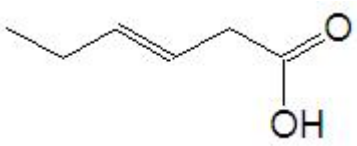
(g)



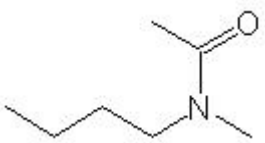
(h)



(i)

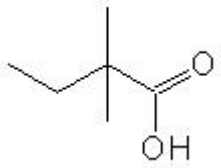


(j)

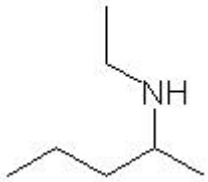


2. Give the IUPAC name of the following molecules

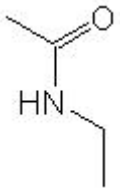
(a)



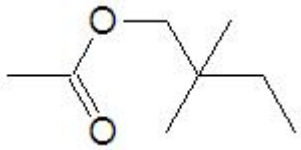
(b)



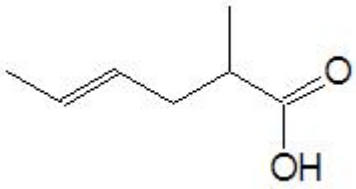
(c)



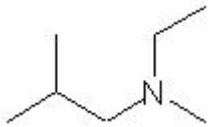
(d)



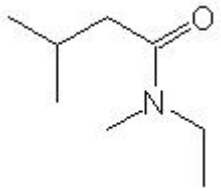
(e)



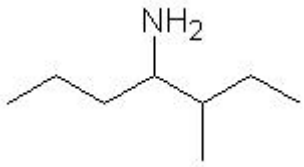
(f)



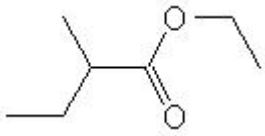
(g)



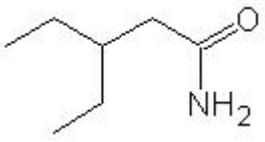
(h)



(i)



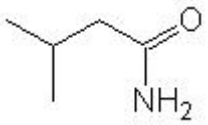
(j)



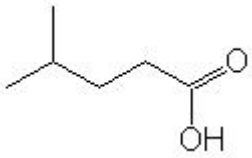
3. Give the IUPAC name of the following molecules

(a) 

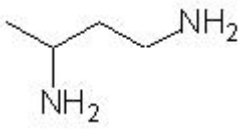
3(a) _____

(b) 

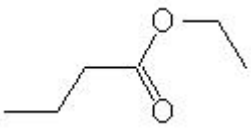
3(b) _____

(c) 

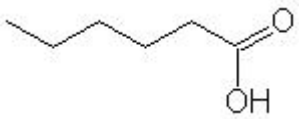
3(c) _____

(d) 

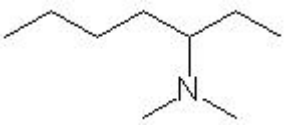
3(d) _____

(e) 

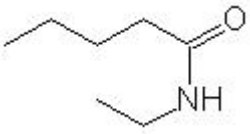
3(e) _____

(f) 

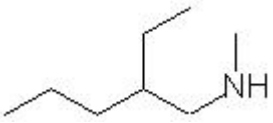
3(f) _____

(g) 

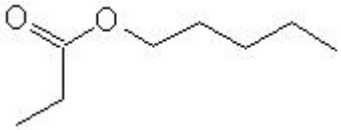
3(g) _____

(h) 

3(h) _____

(i) 

3(i) _____

(j) 

3(j) _____

4. Draw the following organic molecules:

(a) pentanedioic acid	(b) N-methyl-2-butanamine
(c) ethyl 2-methylpropanoate	(d) 3-hydroxy-1-pentanamine
(e) N-ethyl-N-propylethanamide	(f) Aniline
(g) 2,3,4-trimethylpentanoic acid	(h) 2,3-dimethylhexanamide
(i) N,N-dimethyl-2-methyl-1-pentanamine	(j) 2-methylbutyl ethanoate

5. Draw the following organic molecules:

(a) N,N-dimethyl-1-propanamine	(b) butyl ethanoate
(c) N-ethyl-N-methylethanamide	(d) propyl 2,2-dimethylpropanoate
(e) N-methyl-3-pentanamine	(f) 2,4-dimethyl-2-pentanamine
(g) N-methyl-2,3,3-trimethylbutanamide	(h) 6-methylheptanoic acid
(i) 2,3-dimethylbutanoic acid	(j) 3,4,4-trimethylpentanamide

6. Draw the following organic molecules:
   (a) Benzoic Acid

   (b) Diethyldimethylammonium chloride

   (c) Aniline

   (d) Pentanedioc acid

   (e) Sodium ethanoate

   (f) N-methyl-2-butanamine

   (g) N-ethyl-N-methylpropanamide

   (h) Ethyl Benzoate

   (i) Methyl butanoate

   (j) Benzamide

7. Fill in the class of compound for each missing product(s) or reactant(s). If no reaction occurs place a NR in the blank.

   (a) Amide $\xrightarrow[H_2O]{\text{Acid}}$ _____ + _____

   (b) Carboxylic Acid + Thionyl Chloride ($SOCl_2$) $\longrightarrow$ _____ + _____ + _____

   (c) Primary Alcohol $\xrightarrow{[O]}$ _____ $\xrightarrow{[O]}$ _____

   (d) _____ + _____ $\xrightarrow{[H^+ \text{or} \text{Enzyme}]}$ Carboxylic Acid + Alcohol.

   (e) 2^o Amine + Alkyl Halide (RX) $\longrightarrow$ _____ + HX

   (f) Carboxylic Acid + Amine $\xrightarrow{[-H_2O]}$ _____ + H_2O

   (g) Ester + Strong Base $\xrightarrow{[H_2O]}$ _____ + _____

   (h) Nitrile + 2 H_2O $\xrightarrow{[H^+]}$ _____ + _____

   (i) Carboxylic Acid + Alcohol $\xrightarrow{[-H_2O]}$ _____ + H_2O

   (j) Amide $\xrightarrow{LiAlH_4}$ _____

8. Fill in the class of compound for each missing product(s) or reactant(s). If no reaction occurs place a NR in the blank.

   (a) Ester + Strong Base $\xrightarrow{[H_2O]}$ _____ + _____

   (b) Carboxylic Acid + Carboxylic Acid $\xrightarrow{[-H_2O]}$ _____ + H_2O

   (c) Nitrile $\xrightarrow[\Delta]{H_2/N_2}$ _____

   (d) _____ + _____ $\longrightarrow$ Acid Chloride + HCl + SO_2

   (e) Carboxylic Acid $\xrightarrow{red}$ _____ $\xrightarrow{red}$ _____

   (f) _____ + _____ $\longrightarrow$ 3^o Amine + HX

   (g) Amide $\xrightarrow[H_2O]{Acid}$ _____ + _____

   (h) Carboxylic Acid + Alcohol $\xrightarrow{[-H_2O]}$ _____ + H_2O

   (i) 2 $1^o/2^o$ Amines + Acid Chloride $\rightarrow$ _____ + _____

   (j) _____ $\xrightarrow{LiAlH_4}$ 1^o Amine

9. Complete the following reactions by filling in the missing reactants or products. If No Reaction occurs write NR. You may find it helpful to write the type of reaction or draw structures, please feel free too.

(a) _____ $\xrightarrow{[O]}$ Aldehyde $\xrightarrow{[O]}$ _____

(b) Amide $\xrightarrow[H_2O]{Acid}$ _____ + _____

(c) Carboxylic Acid + Thionyl Chloride ($SOCl_2$) $\longrightarrow$ _____

(d) Nitrile $\xrightarrow[\Delta]{H_2/N_2}$ _____

(e) Ester + H_2O $\xrightarrow{[H^+ or Enzyme]}$ _____ + _____

(f) 2^o Amine + Alkyl Halide (RX) $\longrightarrow$ _____

(g) Amide $\xrightarrow{LiAlH_4}$ _____

(h) Carboxylic Acid + _____ $\xrightarrow{[-H_2O]}$ Amide + H_2O

(i) 1^o Amine + Alkyl Halide (RX) $\longrightarrow$ _____

(j) Ammonia + Alkyl Halide (RX) $\longrightarrow$ _____

(k) 3^o Amine + Alkyl Halide (RX) $\longrightarrow$ _____

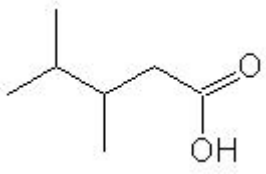
(l) Carboxylic Acid + Carboxylic Acid $\xrightarrow{[-H_2O]}$ _____

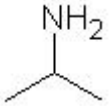
(m) Ester + Strong Base $\xrightarrow{[H_2O]}$ _____ + _____

(n) _____ + Alcohol $\xrightarrow{[-H_2O]}$ Ester + H_2O

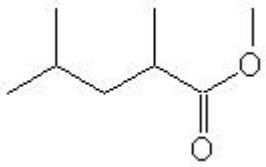
(o) 2 $1^o/2^o$ Amines + Acid Chloride $\rightarrow$ _____ + _____

10. Complete the following reactions by drawing the structure of the missing reactant(s) or product(s). If no reaction occurs write "NR" in the space provided. Partial credit will be awarded if you correctly label the class of compound for both the reactants and products and the reaction mechanism.

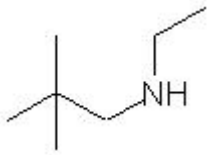
(a) 

$+$ 

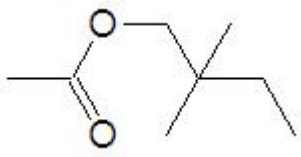
$\xrightarrow{[-H_2O]}$

(b) 

$+$ NaOH $\xrightarrow{[H_2O]}$

(c) 

$+$ HCl $\rightarrow$

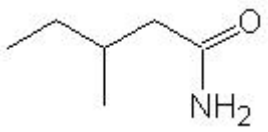
(d) 

$+$ H_2O $\xrightarrow{[H^+ \text{orEnzyme}]}$

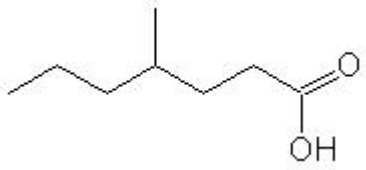
(e) 

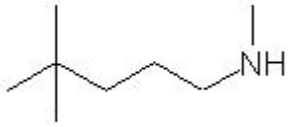
$\xrightarrow[\Delta]{H_2/N_2}$

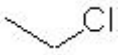
11. Complete the following reactions by drawing the structure of the missing reactant(s) or product(s). If no reaction occurs write "NR" in the space provided. Partial credit will be awarded if you correctly label the class of compound for both the reactants and products and the reaction mechanism.

(a) 

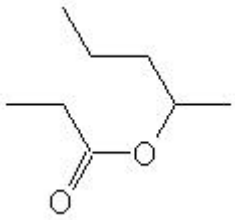
$\xrightarrow{LiAlH_4}$

(b) $\xrightarrow{[O]}$ 

(c) 

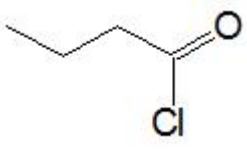
+ 

$\longrightarrow$

(d) + $\xrightarrow{[-H_2O]}$ 

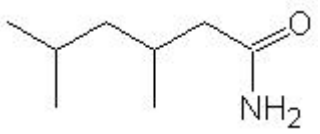
+ H_2O

(e) 

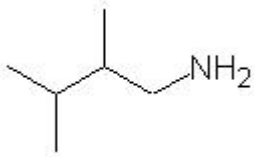
+ 

$\rightarrow$

12. Complete the following reactions by drawing the structure of the missing reactant(s) or product(s). If no reaction occurs write "NR" in the space provided. Half credit will be awarded if you correctly label the class of compound for both the reactants and products.

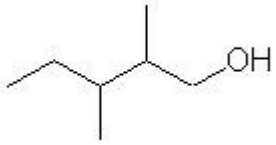
(a) 

$\xrightarrow[\text{NaOH}]{\text{Base}}$ +

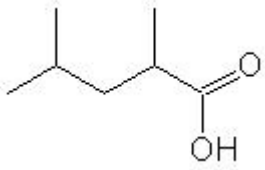
(b) 

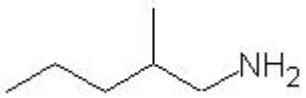
+ 

$\longrightarrow$ +

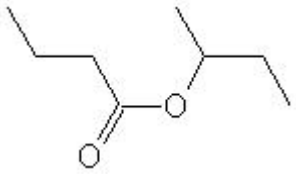
(c) 

$\xrightarrow{[O]}$ $\xrightarrow{[O]}$

(d) 

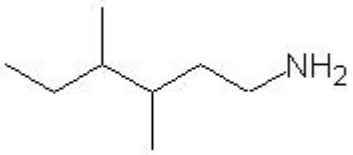
+ 

$\xrightarrow{[-H_2O]}$ + H_2O

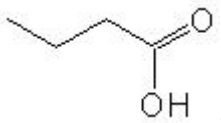
(e) 

+ H_2O $\xrightarrow{[H^+ \text{orEnzyme}]}$ +

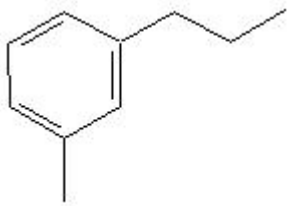
13. Complete the following reactions by drawing the structure of the missing reactant(s) or product(s). If no reaction occurs write "NR" in the space provided. Half credit will be awarded if you correctly label the class of compound for both the reactants and products.

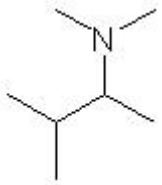
(a) NH_3 + 

$\longrightarrow$ + HCl

(b) 

+ $NH_3(g)$ $\rightarrow$

(c) 
$\xrightarrow[NaOH]{NaMnO_4}$

(d) 

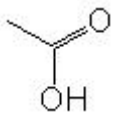
+ 1-chloropropane $\longrightarrow$

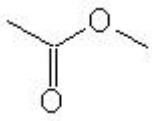
(e) 

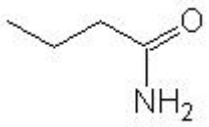
+ 2 H_2O $\xrightarrow{[H^+]}$ +

14. Complete the following reactions by filling in the missing reactants or products. If No Reaction occurs write NR. You may find it helpful to write the type of reaction, the class of the reactants or products, or draw structures, please feel free too.

(a) $CH_3{-}CH_2{-}NH_2 \xrightarrow{CH_3Cl}$ $\xrightarrow{CH_3Cl}$

(b)  $+ \; CH_3{-}NH_2 \xrightarrow{[-H_2O]}$

(c)  $+ \; NaOH \xrightarrow{[H_2O]}$

(d)  $\xrightarrow{LiAlH_4}$

(e)  $\xrightarrow{[O]}$ $\xrightarrow{[O]}$