Organic Chemistry 2
Examination Retake, April 15 2013, 9.00-12.00 h

This exam consists of 5 questions.
- <u>Read the questions carefully!</u>
- For each question the maximum score is given (total 50 points)
- Draw clear structures and write in a clear manner
- Use a separate piece of paper for every question
- On each piece of paper write your name and student number

Enjoy and good luck!

Question 1 (15 points)

1a. Bromobenzene undergoes electrophilic substitution more slowly than benzene, even though substitution occurs preferentially in the *ortho* and *para* positions. Explain these observations based on the general mechanism of electrophilic aromatic substitution.
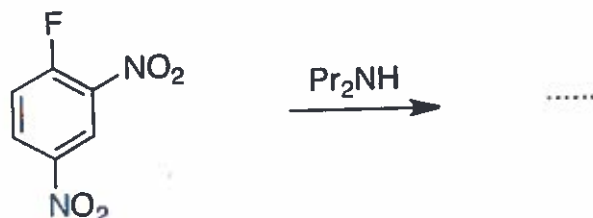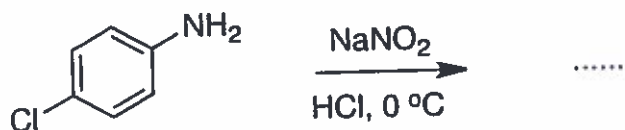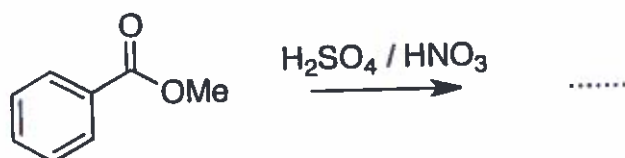
1b. Treatment of benzene with 1-chloro-2-methylpropane and aluminium trichloride gives mostly 2-methyl-2-phenylpropane. Draw the overall reaction and explain this observation.

1c. How do you make the following compounds starting from benzene? Explain your answers.
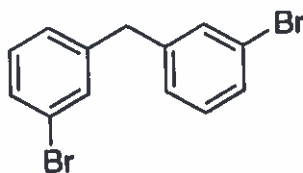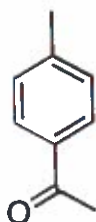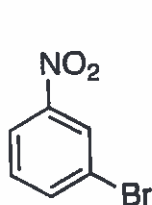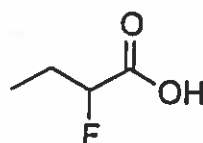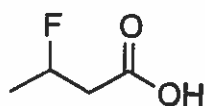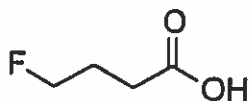

(Home assignment, question 4)

1d. Predict the outcome of the following reactions:
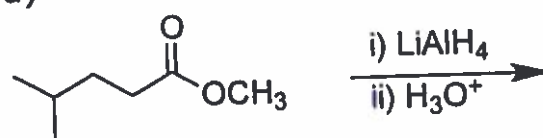
Question 2 (5 points)

Rank the three carboxylic acids shown in order of _decreasing_ acidity (_i.e. 1 = most acidic and 3 = least acidic_). Explain your answer.
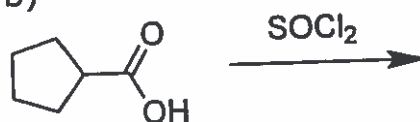
Question 3 (5 points)
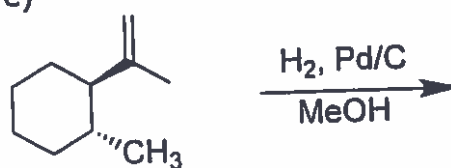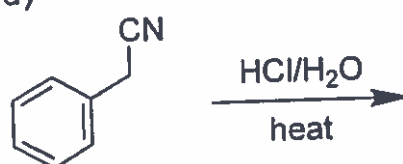
Predict the product of the following reactions:

a)

i) LiAlH$_4$
ii) H$_3$O$^+$

b)

SOCl$_2$
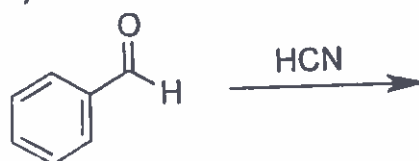
c)

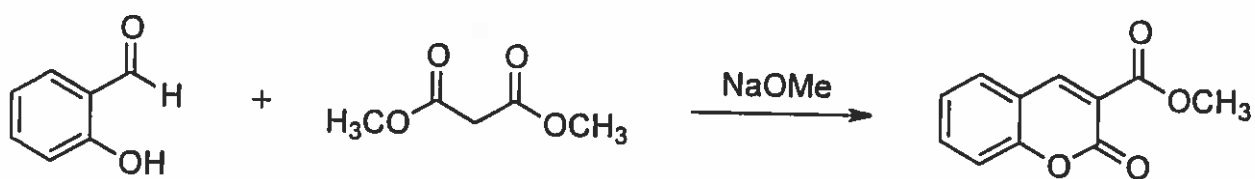

H$_2$, Pd/C
MeOH

d)

CN

HCl/H$_2$O
heat

e)

HCN

Question 4. (15 points)

Provide a mechanism for the following transformation. Be sure to clearly indicate all reaction steps using mechanistic arrows and draw the full structures of all intermediates:

Question 5 (10 points)

5a. How many π-electrons does indole have? And what is the electronic relation of indole to naphthalene, are these aromatic?
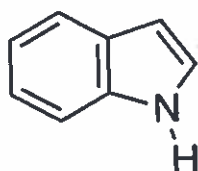
(McMurry 15.37)

5b. Predict which of these structures would be aromatic according to the Hückel rule?

| 1 | 2 | 3 | 4 |

(Home assignment, question 7)