

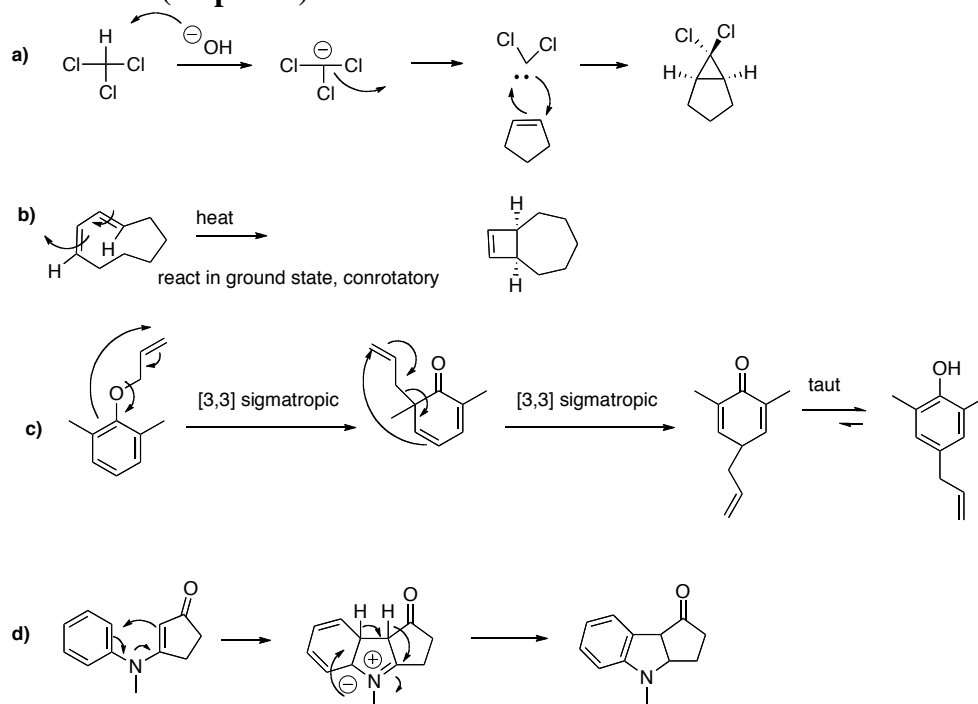
# UNIVERSITY OF OSLO

## Faculty of Mathematics and Natural Sciences

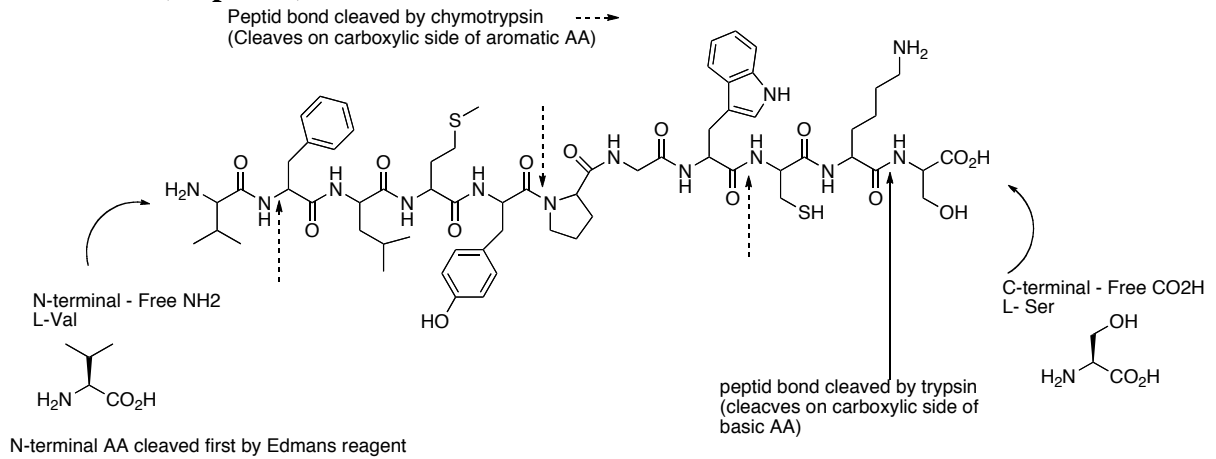
**Exam in** KJM3200 / KJM4200 / KJM9201  
**Day of exam:** June 12<sup>th</sup>, 2009  
**Exam hours:** 14.30 – 17.30  
**This examination paper consists of X page(s).**  
**Appendices:** None  
**Permitted materials:** Pocket calculator and molecular building system

*Make sure that your copy of this examination paper is complete before answering.*

### Exercise 1 (20 points)



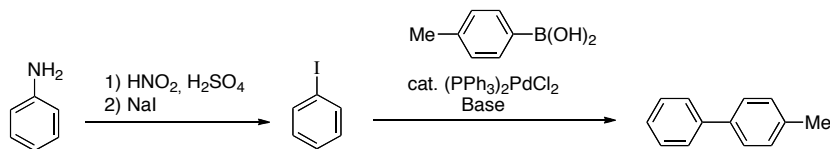
## Exercise 2 (20 points)



Lys: Basic AA (NH<sub>2</sub> in side chain)  
The rest are neutral AA (No acidic groups - CO<sub>2</sub>H in side chains)  
(Tyr weakly acidic phenolic OH, but pI comparable to the other neutral AA)

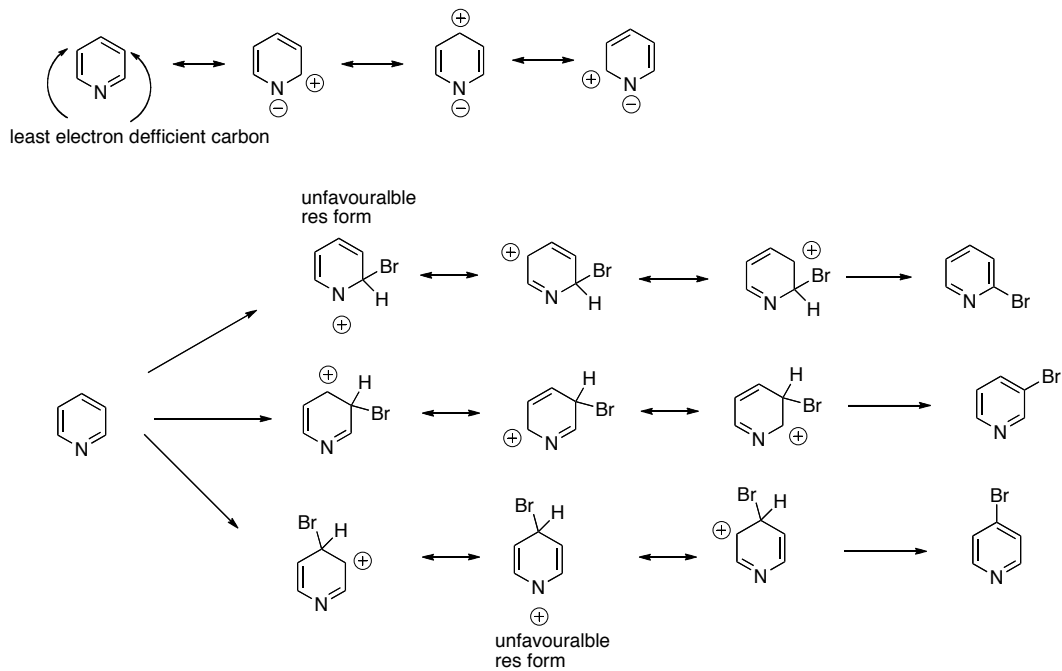
## Exercise 3 (20 points)

a)

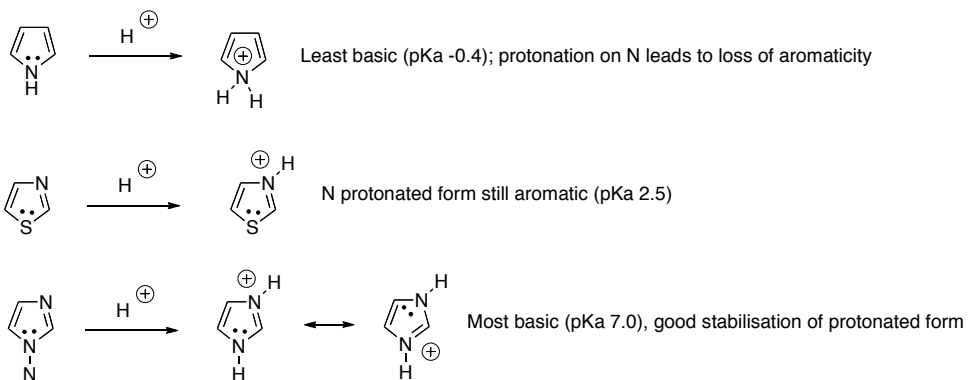


b)

Electrophilic Aromatic subst

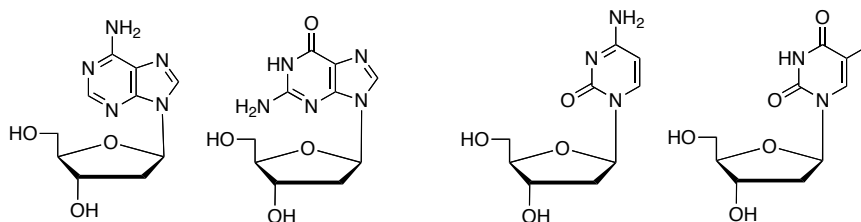


c)

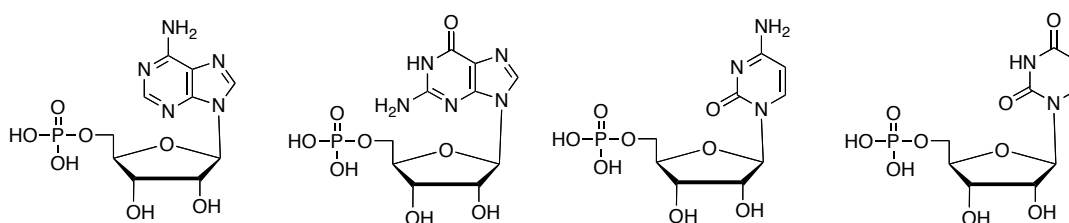


d)

DNA nucleosides

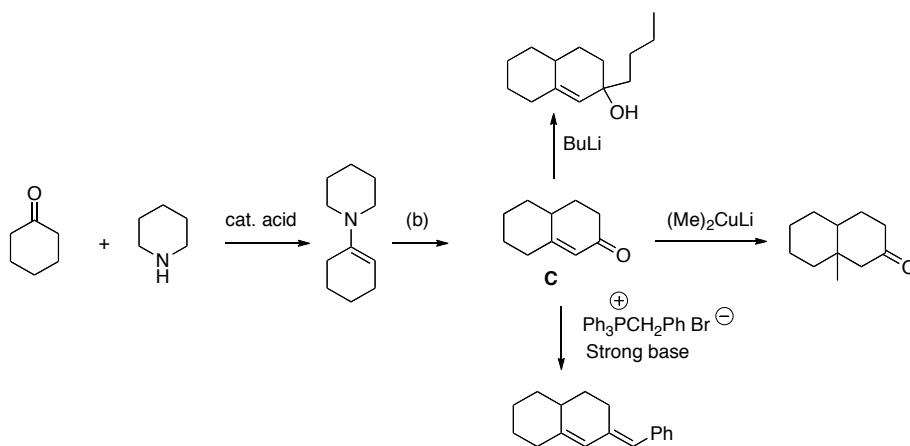


RNA mononucleotides

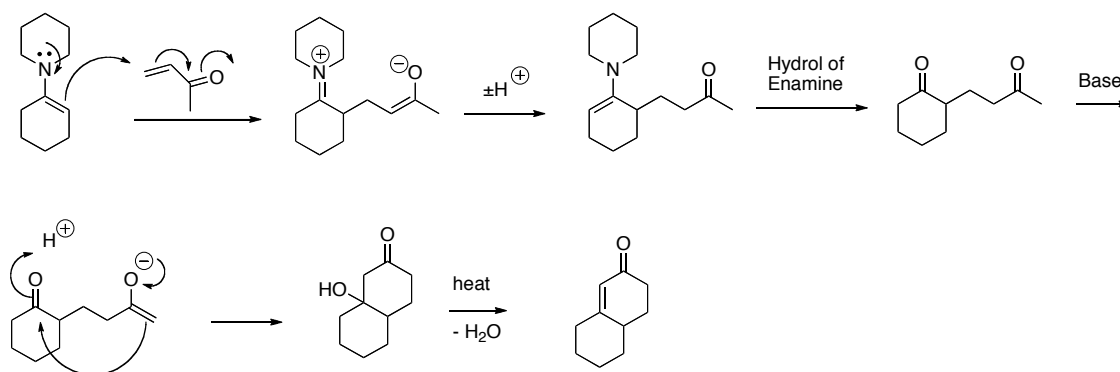


### Exercise 4 (20 points)

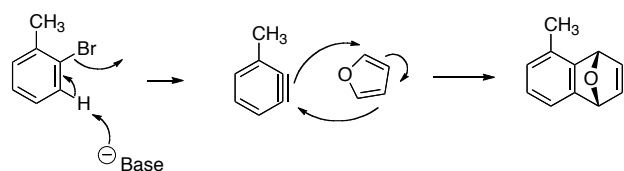
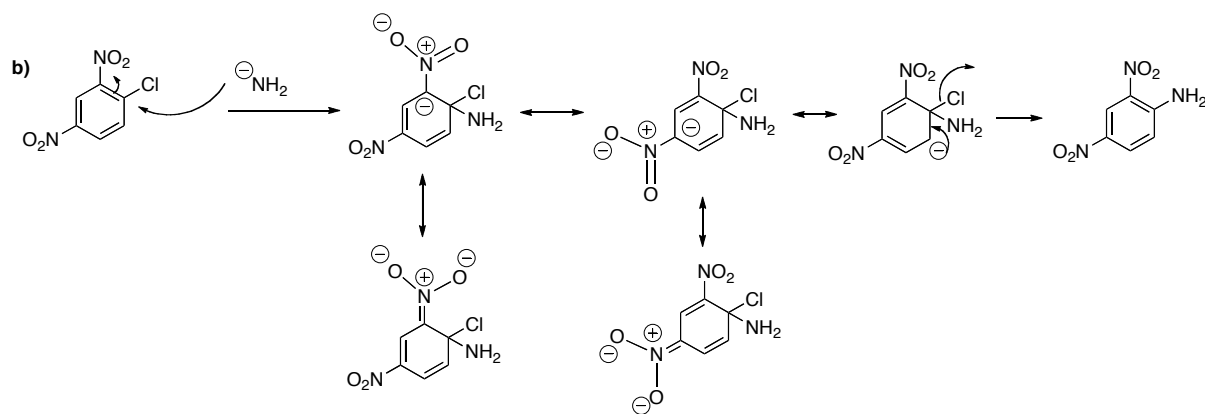
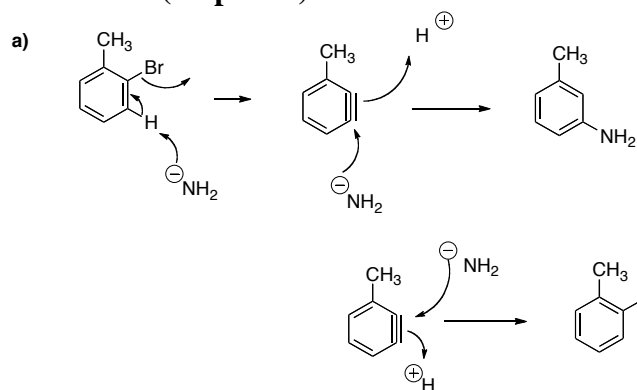
a)



b)



### Exercise 5 (20 points)



d)

