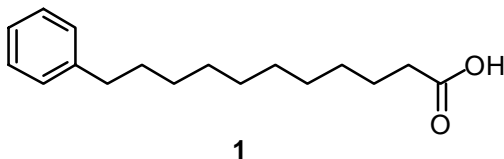### Problem Set 9

1. How many moles of ATP can be produced by metabolizing 1 mole of acid **1**. Count ATP's produced solely by acetyl CoA metabolism (excluding energy gained via oxidation of FAD and NAD cofactors). Explain.
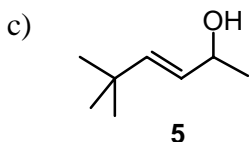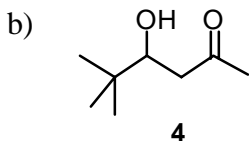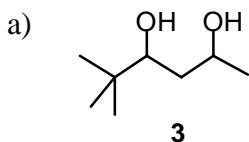

1

2. a) How many condensation steps (Claisen cond.) are required in the biosynthesis of Tylactone antibiotic **2**?
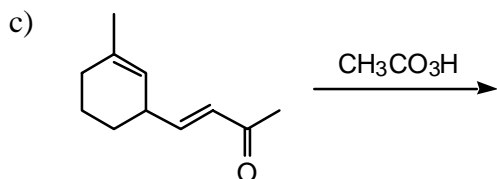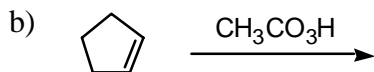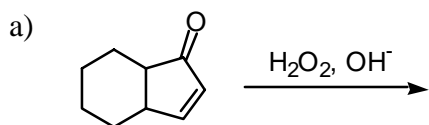b) Disconnect the Tylactone to its building units and specify all necessary post-condensation transformation to yield **2**.
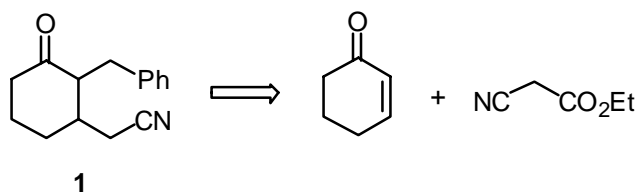
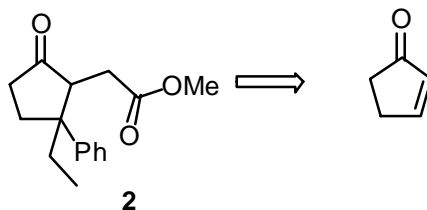

Tylactone, **2**
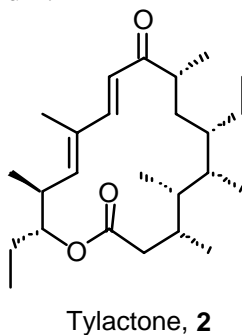
3. Prepare compounds **3**, **4** and **5**.

a)

3

b)

4

c)

5

4. Draw products of the following reactions.
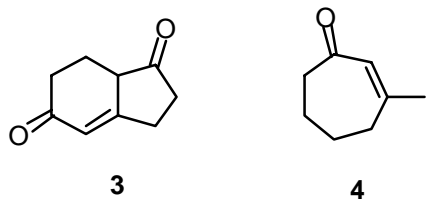
a)

H₂O₂, OH⁻ →

b)

CH₃CO₃H →

c)

CH3CO3H →

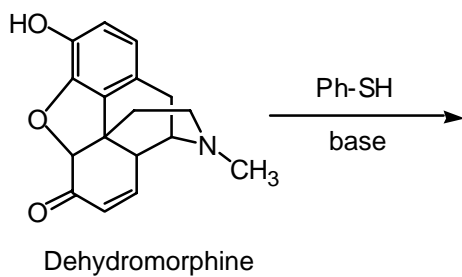**5.** Synthesize compound **1** from given starting materials.

1

6. Propose a synthesis of intermediate **2** from cyclopentenone.
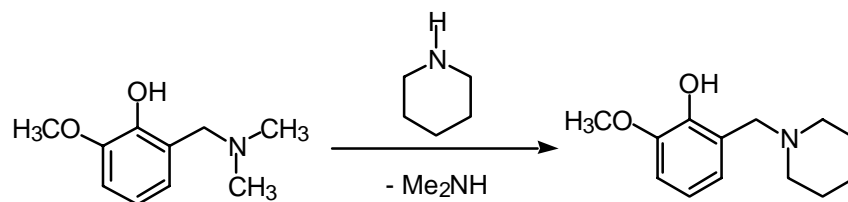

2

7. Prepare compounds **3** and **4** from acyclic starting materials.

3   **4**

8. What product is formed in the following reaction between dehydromorphine and thiophenol in the presence of base. Address stereochemical issues.

Dehydromorphine → (Ph-SH, base)

9. Explain the following experiment.

(piperidine, - Me$_2$NH)

10. Propose a reasonable mechanism for each of these transformations.

a)

+ Me$_2$S

b)

CF$_3$CO$_3$H

c)

NaH

+ (EtO)$_2$P(O)OH