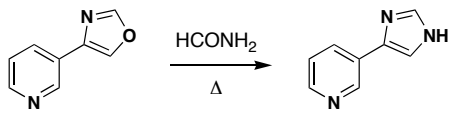
Due Date: Tuesday, April 26th.
Points: 150

Provide reasonable mechanisms for the following transformations. (5 points each)

1



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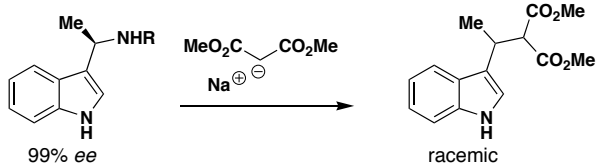

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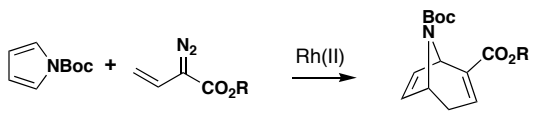

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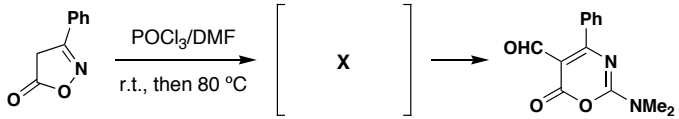

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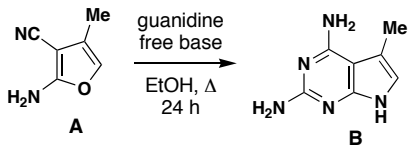
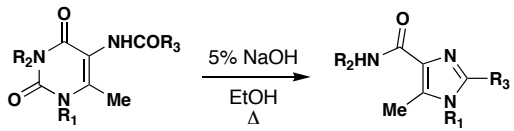


5b Propose a synthesis of **A**

6



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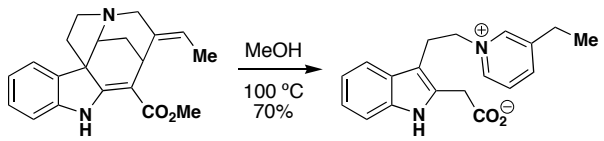

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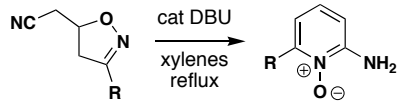

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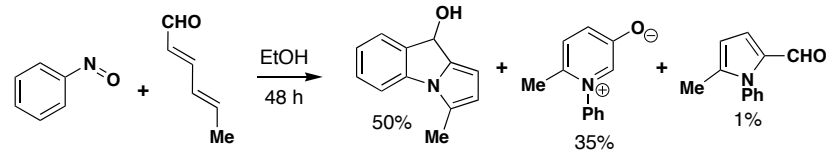

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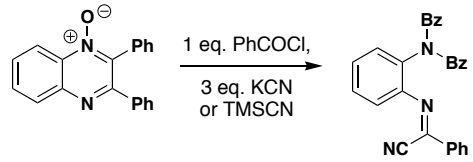

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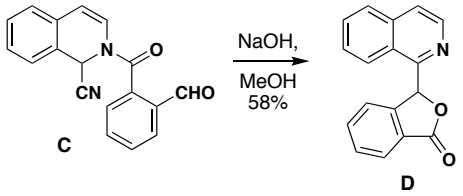
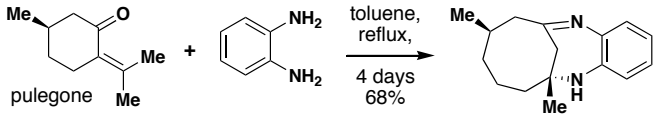


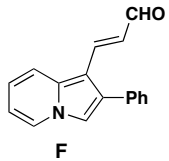
11b Propose a synthesis of **C**

12



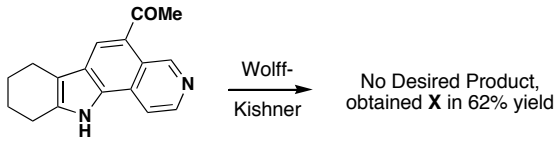
Advanced problems in heterocyclic chemistry (10 points each).

1 Treatment of quinolizinium bromide with two equivalents of piperidine gives a high yield of a product **E**, $C_{14}H_{18}N_2$. Reaction of **E** with phenacyl bromide followed by quenching of the reaction mixture with water gives a product **F** which was originally claimed to be 3-benzoyl-2-vinylindolizine. Subsequent reinvestigation of the structure of **F**, however, showed that it was in fact 3-(2-phenyl-1-indolizinyl)prop-2-ene-1-al. Deduce the structure of **E** and give a reasonable explanation for the conversion of **E** into **F**.



F

2



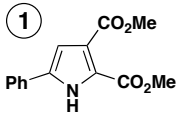
No Desired Product, obtained **X** in 62% yield

Provide the mechanism of formation and structure of **X**:

^{1}H NMR: δ 9.26 (s, 1H), 8.01 (brs, 1H, D_20 exchangeable), 7.75 (s, 1H), 2.59 (q, 2H), 2.43–2.20 (m, 4H), 2.35 (s, 3H), 1.56 (m, 4H), 1.24 (t, 3H).

Provide simple syntheses for the following compounds. (5 points each)
(You may not use Pd or other similar metals that achieve cross-coupling.)
Hint: Most syntheses possible in 1–3 steps.

1



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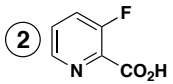

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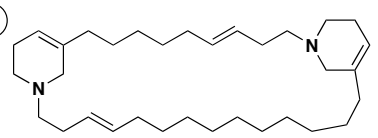

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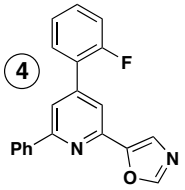

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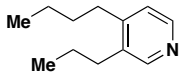

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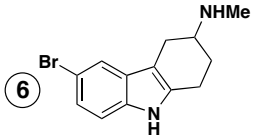

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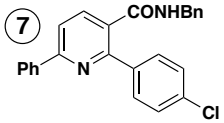

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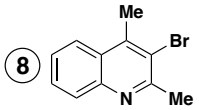

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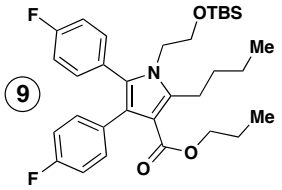

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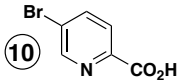

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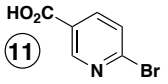

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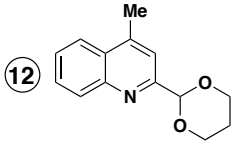

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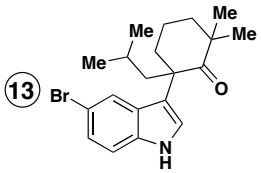

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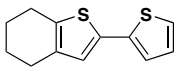

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