My Mom/Dad calls me ____________________________

Directions: This examination is in two parts. PART I consists of seven multiple choice questions (each worth 4 points). Circle the correct answer. PART II (72 points) involves questions of general nature requiring write-up on your part. Be brief, clear and to the point.

RELAX, STAY CALM AND DO YOUR BEST
GOOD LUCK

PART I: MULTIPLE CHOICE QUESTIONS (28pts)

1. The major product(s) formed when 1 mol of methylmagnesium bromide reacts with 1 mol of CH₃C-CH₂-CH₂-COOH is (are):

(a) CH₄ + CH₃-CO-CH₂-CH₂-COOMgBr

(b) CH₃-C-CH₂-CH₂-COOH

(c) CH₃-C-CH₂-CH₂-OH

(d) CH₃-CO-CH₂-CH₂-COCH₃

(e) none of the above

II. Which would be the best reagent(s) for effecting the following reaction?

   \[ \text{cyclohexene} \rightarrow \text{cyclohexanol} \]

(a) H₂SO₄, then H₂O, Δ.
(b) B₂H₆, then H₂O₂, OH
(c) Conc. HBr, then H₂O, Δ
(d) Hg(OAc)_2/THF-H₂O, then NaBH₄, OH
(e) Br₂, then NaOH
III. Which of the following would provide a synthesis of salicyl aldehyde?

(a) Ph-CHO, NaOH, then Ph-OH
(b) Ph-OH, OH, CHCl₃, heat
(c) Ph-COOH, OH, heat
(d) Benzene, OH, CHCl₃, heat
(e) none of the above

IV. Which method could be used for the following synthesis?

\[
\begin{align*}
\text{[Diagram: } \text{OH} \rightarrow \text{O} - \text{CH}_{2} \text{-}}
\end{align*}
\]

(a) NaOH, then \( \text{I} \)
(b) NaOH, then Mel
(c) NaOH, then \( \text{CH}_{2} - \text{OH} \)
(d) NaOH, then CH₃-O
(e) NaOH, then \( \text{CH}_{2} \text{-Br} \)

V. Which reagent would best serve as the basis for a simple chemical test to distinguish between \( \text{C}_6\text{H}_5\text{-O-} \text{C}_6\text{H}_5 \) and \( \beta \)-Naphthol?

(a) H₂SO₄
(b) NaOH (aq.)
(c) NaHCO₃ (aq.)
(d) more than one of the above
(e) none of the above
VI. Which of the reagents listed below would serve as the basis for a simple chemical test to distinguish between

(a) KMnO₄ in H₂O
(b) H₂CrO₄
(c) I₂/NaOH, heat
(d) cold conc. H₂SO₄
(e) Br₂/CCl₄

VII. Which reagent would best serve as the basis for a simple chemical test to distinguish between

(a) CuSO₄, NaOH and sodium ammonium tartarate solution
(b) I₂/NaOH solution, heat
(c) NH₄OH
(d) DNP reagent
(e) all of the above

PART II: QUESTIONS REQUIRING WRITE-UP:

1. Predict the major organic product(s) in each of the following reactions; write NR for no reaction. (36 pts.)

(1) \[ \text{[Image]} \]

(2) \[ \text{[Image]} \]

(3) \[ \text{[Image]} \]

(4) \[ \text{[Image]} \]

(5) \[ \text{[Image]} \]
II. Propose a mechanism for the following reactions. (12 pts.)  

(a) \[ \text{problem 16 -55a} \]
b)\chem{\text{OEt}} 
\xrightarrow{\text{i. } 1\text{ mol MeMgBr}} \xrightarrow{\text{a. } H_2O^+} \chem{\text{O}} + \chem{\text{EtOH}} 

(\text{problem 16-45a})

III. a) List three different sets of reagents (a carbonyl compound and a Grignard reagent) that could be used to prepare the following alcohol: 

(6 pts.) 

(\text{problem 4Ca})
b) In aqueous solution, glucose, \( \text{C}_6\text{H}_{12}\text{O}_6 \), exists in equilibrium with two six-membered ring compounds. Give the structures of these compounds. Which of the two ring compounds will be present in greater amount? (6 pts.)

IV. The only organic compound obtained when compound 'A' undergoes the following sequence of reactions shows the following NMR data:
\( \delta \) 7.5 (5H, m) and \( \delta \) 10.2 (1H, s)
Identify compounds 'A', B and C. Show all reactions involved. (12 pts.)

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compound 'A':
1. \text{1mol PhMgBr} \rightarrow B
2. \text{H}_3\text{O}^+ \rightarrow B
3. \text{H}_2\text{SO}_4, \Delta \rightarrow B
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\( \text{O}_3 \rightarrow C \)

\( \text{Zn/}H_2O \rightarrow C \)