Organic Chemistry: Chapters 1-4, 5 (partial)
Last Name: $\qquad$ First Name: $\qquad$

## MAKE SURE THAT YOUR NAME IS WRITTEN AND BUBBLED ON THE GREEN ANSWER SHEET.

1) Place all books and papers on the floor. Programmable calculators are not permitted. Ask if you have questions.
2)     * Write your name on side one of the green \& white bubble answer sheet.

* Write your name (last name first) on side 2 of the answer sheet. Fill in the bubbles.

3) Answer the multiple-choice questions by filling in the correct bubble on the green answer sheet. (You may want to mark your answers on these pages as well so you can check your work later.) For these questions, only the bubble sheet will be graded.
4) A Periodic Table and scrap paper are also provided.
5) Regulations on Academic Honesty will be strictly enforced during the exam. Violation of this policy WILL result in a grade of $F$ in the course.
6) If any instructions are not clear, be sure to ask for assistance.

1. What is the molecular formula of the noted compound below? (5 PTS)
(+)-Limonene
a) $\mathrm{C}_{12} \mathrm{H}_{12}$
b) $\mathrm{C}_{10} \mathrm{H}_{15}$
c) $\mathrm{C}_{10} \mathrm{H}_{22}$
d) $\mathrm{C}_{9} \mathrm{H}_{20}$
e) $\mathrm{C}_{10} \mathrm{H}_{16}$
2. What is the name of the molecule given in the Newman projection? (5 PTS)

a) 3-ethyl-2-methylhexane
b) 2-methyl-4-ethylpentane
c) 3-(1-ethyl)-3-methylheptane
d) 4-ethyl-2-methyllhexane
e) 3-methyl-5-ethylhexane
3. From the Newman projection above, draw out the molecule in linear, stick form. (10 PTS)
4. Which of the following could have both methyl groups in an equatorial orientation? (5 PTS)
A)

B)

C)

D)

E)

5. From question \#4 above, draw the chair conformer of compound $D$ ) in the most stable form. Denote whether the methyl group relationship is cis or trans. (10 PTS)
$\square$
6. Which one of the following structures is incorrect? (5 PTS)
A) AOO
B)
C)

D)

E)

7. How many quaternary carbons are in the following molecule? (5 PTS)

A) They might all be quaternary carbons
B) 0
C) 2
D) 5
E) 4
8. What would be the proper name of the following: (5 PTS)

A) cis-1-tert-butyl-4-methylcyclohexane
B) trans-1-isopropyl-4-methylcyclohexane
C) axial, equatorial-1-tert-butyl-4-methylcyclohexane
D) cis-1-isopropyl-4-methylcyclohexane
E) trans-1-tert-butyl-4-methylcyclohexane
9. What is the major product $\mathbf{Y}$ of the following reaction? Draw a detailed mechanism using half arrows and the Headings: Initiation, Propagation, Termination. Be very detailed for full marks. Illegible writing will be marked with a 0 . Take the whole page below to draw out your answer. (10 PTS)

10. Consider the potential energy diagram for rotation about the $\mathrm{C} 2-\mathrm{C} 3$ bond in pentane. The position marked "A" most likely corresponds to which of the following Newman projections? (5 PTS)

A)

D)

B)

E)

C)

11. How many different resonance structures can be drawn for acetic acetate (shown below)? (5 PTS)

A) 6
B) 4
C) 2
D) 5
E) 3
12. Which of the following structures represent cis-1,4-dimethylcyclohexane? (5 PTS)

I

II

III
A) all of the above
B) I\& II
C) none of the above
D) $1 \mathrm{I} \& \mathrm{III}$
E) I \& III
13. How many different products will result if radical monobromination of the following compound only occurs at $3^{\circ}$ carbons. Hint: Monobromination means one bromine per $3^{\circ}$ carbon $=1$ compound. A compound will not under dibromination. (5 PTS)

A) 6
B) 4
C) 0
D) 1
E) 3
14. What is the correct name for the following molecule? (5 PTS)

A) 1-chloro-3-methyl-4-propylcyclopentane
B) 1-bromo-2-methyl-4-(1-methypropyl)cyclopentane
C) 1-bromo-2-methyl-4-(1-methypropyl)cyclobutane
D) 3-bromo-2-methyl-5-(1-methypropyl)cyclohexane
E) 3-bromo-4-methyl-(1-methylpropyl)cyclopentane
15. In the molecule below, what type of group is labeled as d? (5 PTS)
A) $1^{\circ}$ amine
B) $2^{\circ}$ amine
C) $3^{\circ}$ amine
D) amide
E) ether

16. Using compound above, what type of functional group is labelled c? (5 PTS)
A) ether
B) ketone
C) aldehyde
D) alcohol
E) ester
17. How many chiral centers are present in this molecule? (5 PTS)

A) 2
B) 3
C) 4
D) 5
E) 6
