I.A. **TRANSLATION:** On SCANTRON mark letter of the BEST translation. (#1-13) 24 pts.

1. If Keith and Nan quit, then Beth will quit too.
   a  \((k \land n) \rightarrow b\)  \(c\) both a and b
   b  \((k \rightarrow b) \land (n \rightarrow b)\)  \(d\)  \(b \rightarrow (k \land n)\)

2. Neither Greta nor Elena is working.
   a  \((g \lor e) \rightarrow \sim w\)  \(c\)  \(\sim g \lor \sim e\)
   b  \(\sim (g \lor e)\)  \(d\)  \(b\) and c are both correct

3. Alicia or Marco, but not both, will be promoted.
   a  \(a \lor m\)  \(b\)  \((a \lor m) \land \sim (a \land m)\)  \(c\)  \(p\) (not truth-functionally compound)

4. Ben and Martha shared a pizza.
   a  \(b \land m\)  \(b\)  \((b \land m) \rightarrow p\)  \(c\)  \(s\) (not truth-functionally compound)

5. Anita has the flu or food poisoning if she doesn’t have appendicitis,
   a  \((f \lor p) \rightarrow \sim a\)  \(b\)  \(\sim a \rightarrow (f \lor p)\)  \(c\)  \((\sim f \lor \sim p) \rightarrow a\)

6. Ned won’t be promoted unless the economy improves.
   a  \(\sim e \rightarrow \sim p\)  \(b\)  \(e \rightarrow \sim p\)  \(c\)  \(e \rightarrow p\)  \(d\)  \((e \rightarrow p) \land (\sim e \rightarrow \sim p)\)

7. Earning 3 units is sufficient for Gail to graduate this semester.
   a  \((e \rightarrow g) \land (\sim e \rightarrow \sim g)\)  \(b\)  \(e \rightarrow g\)  \(c\)  \(\sim e \rightarrow \sim g\)  \(d\)  \(e \land g\)

8. Harry will quit his job only if he has a better job lined up.
   a  \((b \rightarrow q) \land (\sim b \rightarrow \sim q)\)  \(b\)  \(b \rightarrow q\)  \(c\)  \(\sim b \rightarrow \sim q\)  \(d\)  \(q \land b\)

9. Raphael must pass math or physics to graduate.
   a  \((m \lor p) \rightarrow g\)  \(c\)  \((m \lor p) \rightarrow \sim g\)  \(e\)  \(both c and d\)
   b  \(\sim g \rightarrow (m \lor p)\)  \(d\)  \((\sim m \lor \sim p) \rightarrow \sim g\)

10. If the head of the office leaves, so well the second in command, and if that happens the third in the chain will take over the leadership of the office.
    a  \(h \rightarrow (s \rightarrow t)\)  \(b\)  \((h \rightarrow s) \rightarrow t\)  \(c\)  \((h \rightarrow s) \land (s \rightarrow t)\)  \(d\)  \((h \land s) \rightarrow t\)

11. Tina won’t quit her job, since she’d be silly to quit without another job offer and she’s not silly. Although she’s applied at several places, she hasn’t gotten any offers.
    a  \((\sim o \land s) \land \sim s\)  \(b\)  \((\sim o \rightarrow s) \land \sim s\)  \(c\)  \(\sim q\)  \(d\)  \(\sim q\)
    a \& \sim o  \(\therefore\)  \(\sim q\)  \(a \& \sim o  \(\therefore\)  \(\sim q\)  \(a \& \sim o  \(\therefore\)  \(\sim q\)

12. If the cake doesn’t have both baking soda and baking powder, it won’t rise. It’s not going to rise because someone forgot to put in the baking powder.
    a  \((s \land p) \rightarrow \sim r\)  \(c\)  \((\sim s \land \sim p) \rightarrow \sim r\)
    \(\sim p\)  \(\therefore\)  \(\sim r\)
    \(\therefore\)  \(\sim p\)
    \(\therefore\)  \(\sim r\)
    b  \((s \land p) \rightarrow \sim r\)  \(d\)  \((s \land p) \rightarrow \sim r\)
    \(\sim p \rightarrow \sim r\)  \(\therefore\)  \(\sim r \rightarrow \sim p\)

→ → OVER → →
II. TRUTH TABLES
A. Mark best answer on SCANTRON (#13 - 17) 10 pts.

13. Assuming the table below is correct, it shows that the argument at right is truth-functionally valid.

\[
\text{(j & k)} \rightarrow \text{l} \\
\sim \text{(l } \rightarrow \text{k)} \lor \sim \text{j} \\
\therefore \quad \text{k}
\]

a) invalid because there’s no row where columns 4-10 all have T
b) invalid because on at least one row, columns 5 and 6 have T but column 10 has F
c) valid because on at least one row, columns 5, 6, and 10 all have the same values
d) valid because there is at least one row where columns 5, 8, and 10 all have T

e) valid because there is no row where columns 5 and 8 have T but column 10 has F

\begin{tabular}{cccccccccccc}
Row 1 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
1 & T & T & T & & & & & & & \\
2 & T & T & F & & & & & & & \\
3 & T & F & T & & & & & & & \\
4 & T & F & F & & & & & & & \\
5 & F & T & T & & & & & & & \\
6 & F & T & F & & & & & & & \\
7 & F & F & T & & & & & & & \\
8 & F & F & F & & & & & & & \\
\end{tabular}

\begin{tabular}{cccccccccccc}
Row 1 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
1 & T & T & T & & & & & & & \\
2 & T & T & F & & & & & & & \\
3 & T & F & T & & & & & & & \\
4 & T & F & F & & & & & & & \\
5 & F & T & T & & & & & & & \\
6 & F & T & F & & & & & & & \\
7 & F & F & T & & & & & & & \\
8 & F & F & F & & & & & & & \\
\end{tabular}

14. Assuming all other values are correct, COLUMN 5 has errors in row(s)

a) 3 and 4  b) 7 and 8  c) both a and b  d) neither a nor b

15. Assuming all other values are correct, COLUMN 6 has errors in row(s)

a) 2  b) 3  c) both 3 and 4  d) neither 3 nor 4

16. Assuming all other values are correct, COLUMN 8 has errors in row(s)

a) 1  b) 3  c) 4  d) 7  e) none of a - d

17. There should be ___ rows in an argument to test this argument for validity:

\[
(p \lor q) \rightarrow (r \lor s) \\
l \rightarrow \sim (r \& m) \\
\therefore (q \& m) \rightarrow s
\]

a) 64  b) 32  c) 24  d) 16  e) 8

II.B. In your bluebook, construct a truth table to determine whether the argument below is truth-functionally valid. 13 pts.

1. Completely fill in columns under all connectives.
2. Say whether the argument is truth-functionally valid or not.

\[
(p \lor q) \rightarrow (p \& q) \\
\therefore \quad q
\]

III. A Replaced by diagrams on last page.


26. Every argument that is

a) categorically valid is also deductively valid  c) both a and b
b) deductively valid is also categorically valid  d) neither a nor b

27. Which is the correct diagram for the sentence ‘Some dragons do not breath fire’?

\begin{tabular}{cccccc}
\ & a & b & c & d & e \\
Dragon & Fire-breathers & Dragons & Fire-breathers & Dragons & Fire-breathers \\
Fire-breathers & Dragons & Fire-breathers & Dragons & Fire-breathers & Dragons \\
\end{tabular}
28. Which diagram, if any, is correct for the argument at right? All birds are animals.
   Some animals don't fly.
   \[\therefore\] Some birds don't fly.
   a  None of the diagrams below is correct.

   [Diagram images]

29. Which diagram(s) in #30 would, IF CORRECT, show that the argument in #30 is valid?
   a none of them  b  c  d  e

30. Some athletes are divers.
    Some divers are not swimmers.
    So some athletes are not swimmers.

   For the categorical structure of the argument above to be valid, the correct diagram for
   the argument would have to result in
   a  'x' in region 2 and 'x' in region 5
   b  'x' anywhere in the combination of regions 2 and 5
   c  shading in region 3 and region 6
   d  shading in region 4 and region 7
   e  'x' anywhere in the combination of regions 4 and 7

   [Diagram images]

IV.B ON THIS QUESTION SHEET, label and complete the diagram below for this argument.
Remember that each label should indicate a group or category of things. 8 pts.
   Some actors are not comedians.
   No comedians are scary.
   So no actors are scary.

   [Diagram images]

   ACCORDING TO YOUR DIAGRAM:
   Is this argument categorically valid?
   Circle one:  YES  NO
   The is the answer because:
   Circle one:  There is  There is not
   Circle one:  shading  an X
   in region or regions (circle):  1  2  3  4  5  6  7

   [Diagrams on next page]
Sample multiple-choice diagram questions

1. [background] Reproducing and delivering digital content — words, music, software, pictures, video — has now fulfilled the prophecy once made about electricity. It has become too cheap to meter. …More precisely, [1] the marginal cost of digital products, or the cost of delivering one additional copy, is approaching zero. [2] The fixed cost of producing the first copy, however, may be as high as ever. [3] All those servers and transmission lines, as cheap as they may be per gigabyte, require large initial investments. [4] The articles still have to be written, the songs recorded, the movies made. [5] The crucial business question, then, is how you cover those fixed costs. [6] As many an airline bankruptcy demonstrates, it can be extremely hard to survive in a business with high fixed costs, low marginal costs and relatively easy entry.


3. Although recent findings have brought the theory of a strong hereditary predisposition to obesity to the forefront, (1) it will be hard for health professionals to stop suggesting that personal sacrifice will lead to weight loss. For one thing, (2) there certainly are success stories of people who have dropped dozens of pounds by drastically altering their lifestyles. Moreover, (3) watching one’s diet can have beneficial health effects beyond losing weight. And (4) I just cannot conceive of a session with an overweight patient that does not involve a discussion of being careful at holiday meals, controlling portion size, avoiding bedtime snacks and trying to exercise three times a week. Somehow (5) it still seems to me that part of a doctor’s job is to push patients to try harder.