1. True or False (5 points)
Directions: For each of the following, circle the best answer.

1. T  F  Some arguments are false.
2. T  F  All valid arguments have true conclusions.
3. T  F  All invalid arguments have at least one false premise, or else a false conclusion.
4. T  F  An argument is sound just in case it is valid and every premise is a well-known truth.
5. T  F  In the sentence “John will go, if Suzie goes,” the antecedent is “John will go”.

2. The Counterexample Method (10 points)
Directions: Using the scheme of abbreviation provided, state the form of the argument. Then use the counterexample method to show that it is invalid. It is best to employ terms whose interrelations are well known, such as “cat,” “dog,” “collie,” “mammal,” and “animal”; or, “square,” “triangle,” “3-sided,” “4-sided,” “plane figure,” and “geometrical figure”. If you must, you can use fire and air and the like.

If Calin is the best rebounder, then Ira is the best scorer. Ira is the best scorer. So, Calin is the best rebounder.
(C = Calin is the best rebounder; I = Ira is the best scorer)

1. If C, then I.
2. I.
3. So, C.

If the piece of paper you are looking at is a baboon, then it is a physical object. WKT
2. The piece of paper you are looking at is a physical object. WKT
3. So, the piece of paper you are looking at is a baboon. WKF

3. The Famous Forms Method (10 points)
Directions: Using the scheme of abbreviation provided, state the form of the argument. Then use the famous forms method to argue that it is valid.

If Theresa buys the first edition Greg Baer novel, then she will have Mr. Baer autograph it on Monday. If Theresa buys the first-edition Orson Scott Card novel, then she will have Mr. Card autograph it on Tuesday. Since she’s either going to buy the first edition Greg Baer novel or she’s going to buy the first edition Orson Scott Card novel, it follows that she’ll either have Mr. Baer autograph his novel on Monday or she’ll have Mr. Card autograph his novel on Tuesday.
(B = Theresa buys the first edition Greg Baer novel; M = Theresa will have Mr. Baer autograph his novel on Monday; C = Theresa buys the first-edition Orson Scott Card novel; T = Theresa will have Mr. Card autograph his novel on Tuesday)

1. If B, then M.
2. If C, then T.
3. Either B or C.
4. So, M or T.

Constructive dilemma
4. Multiple Choice (10 points)

Directions: Circle the letter next to the best answer, or write in the answer on the line provided.

1. In the statement $A \rightarrow B$,
   a. $A$ provides a necessary condition for $B$.
   b. $B$ provides a sufficient condition for $A$.
   c. **A provides a sufficient condition for** $B$.
   d. $A$ provides both a necessary and sufficient condition for $B$.
   e. Some combination of a-d, namely this: _____________
   f. None of the above

2. On which assignment of truth values to the atomic statements does the compound statement $A \rightarrow \neg B$ turn out to be false?
   a. $A$ is true, and $B$ is true.
   b. $A$ is true, and $B$ is false.
   c. $A$ is false, and $B$ is true.
   d. $A$ is false, and $B$ is false.
   e. Some combination of a-d, namely this: _____________
   f. None of the above.

3. The statement $[(\neg A \lor B) \cdot A] \rightarrow B$ is a
   a. contradiction
   b. tautology
   c. contingent statement
   d. logical equivalence
   e. some combination of a-d, namely this: _____________
   f. none of the above.

4. A material conditional is false just in case
   a. its antecedent is false and its consequent is false.
   b. **its antecedent is true and its consequent is false.**
   c. its antecedent is false and its consequent is true.
   d. its antecedent is true and its consequent is true.
   e. some combination of a-d, namely this: _____________
   f. none of the above.

5. The statement “God exists *only if* either there is no evil or there is a good reason for Him to permit evil” is best translated as a
   a. **material conditional**
   b. biconditional
   c. disjunction
   d. conjunction
   e. negation
   f. Some combination of a-e, namely this: _____________
   g. None of the above

5. Symbolizing (10 points)

Directions: Each of the following is a single compound statement. Translate each one into symbols, using the scheme of abbreviation provided.

1. Both Patricia and Scott are prepared for the test, but neither Henry nor Agnes is prepared for the test. ($P = \text{Patricia is prepared for the test}; S = \text{Scott is prepared for the test}; H = \text{Henry is prepared for the test}; A = \text{Agnes is prepared for the test}$)
   
   $(P \cdot S) \cdot (\neg(H \lor A)) // \text{Alternative: } (P \cdot S) \cdot (\neg H \cdot \neg A)$
2. If there’s too much rain in the early spring and not enough during the summer, the tomato crop will not be very good; however, the pears and the apples will be excellent. (T: there’s too much rain in the early spring; E: there’s enough rain during the summer; C: the tomato crop will be very good; P: the pears will be excellent; A: the apples will be excellent)

\[(T \land \neg E) \rightarrow \neg C \land (P \land A)\]

6. Determining Truth Values (10 points)
Directions: Circle T (true) or F (false) depending on which is the truth value of the following compound statements. Make the following assumptions: A is true, B is true, C is false, D is false.

1. T F B \rightarrow \neg(A \land B)
2. T F \neg(A \lor C) \iff [B \land \neg(A \lor C)]

7. Complete Truth Tables (10 points)
Directions: Construct a complete truth table beneath the following argument and then circle V (valid) or I (invalid) depending on whether the argument is valid or invalid. If it is invalid, put a star next to all of the rows that show that it is invalid. For our purposes a complete truth table will have, at least, a truth value assigned for each premise, logical connective, and conclusion of every row.

V I A \lor B, A \therefore \neg B

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>A \lor B</th>
<th>A \therefore \neg B</th>
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8. Abbreviated Truth Tables: Invalidity (10 points)
Directions: Construct an abbreviated truth table beneath the following argument to show that it is invalid.

B \lor \neg(D \land C), A \rightarrow \neg D \therefore A \rightarrow (B \lor C)

<table>
<thead>
<tr>
<th>B</th>
<th>D</th>
<th>C</th>
<th>A</th>
<th>B \lor \neg(D \land C), A \rightarrow \neg D \therefore A \rightarrow (B \lor C)</th>
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<tr>
<td>F</td>
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9. Abbreviated Truth Tables: Validity (20 points)
Directions: Construct an abbreviated truth table beneath each of the following arguments to show that each of them is valid.

1. A \lor (B \lor C), \neg A \therefore B \lor C

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<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A \lor (B \lor C), \neg A \therefore B \lor C</th>
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<td>T T F F F</td>
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</table>

2. A \rightarrow (B \lor C), (B \lor C) \rightarrow (D \land E), A \therefore D \land E

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<thead>
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<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>A \rightarrow (B \lor C), (B \lor C) \rightarrow (D \land E), A \therefore D \land E</th>
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10. Logically significant categories (5 points)

Directions: Circle the best answer from amongst those provided.

The statement \([(F \rightarrow G) \cdot \sim F] \rightarrow \sim G\) is a

a. logical equivalence
b. contradiction
c. tautology
d. contingent statement

e. some combination of a-d, namely ________________
f. none of the above

Extra Credit (5 points)

Directions: Using the scheme of abbreviations provided, show whether the following argument is valid or invalid using an abbreviated truth table.

If an adult human being has a future of value, then it is wrong to kill him or her. It is wrong to kill an adult human being if he or she has a future of value only if it is wrong to kill anything that would have a future of value. If it is wrong to kill anything that would have a future of value, then it is wrong to abort most first trimester fetuses. So, it is wrong to abort most first trimester fetuses. (A: an adult human being has a future of value; B: it is wrong to kill an adult human being; C: it is wrong to kill anything that would have a future of value; D: it is wrong to abort most first trimester fetuses)

Valid

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<th>A → B, (A → C) → D :. D</th>
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