

YOUR NAME: \_\_\_\_\_

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Consider propositional variables  $A, B$  and  $C$ . Use the truth table method to show that the two propositions  $A \rightarrow (B \vee C)$  and  $(A \wedge \neg B) \rightarrow C$  are equivalent.

(b) Assume the following:

$A$  : “ $n$  is a nonnegative integer”

$B$  : “ $n$  is even”

$C$  : “ $n$  is odd”

Express in ordinary English the following propositions:

–  $A \rightarrow (B \vee C)$ :

–  $(A \wedge \neg B) \rightarrow C$ :

2. (a) Let  $A$  be a propositional variable and let  $F$  be a false proposition. Construct the truth table for  $(\neg A \rightarrow F) \rightarrow A$ .

In class, we gave a proof of the statement “There are infinitely many primes”. Answer the following questions concerning the proof. You must be concise and precise.

- (b) We gave a proof by \_\_\_\_\_
- (c) We assumed that \_\_\_\_\_
- (d) Under (c) we proved that \_\_\_\_\_
- (e) We concluded that \_\_\_\_\_
- (f) Which statement should  $A$  stand for in Part (a) so that the proof described in Parts (c)-(e) is mirrored by the proposition  $(\neg A \rightarrow F) \rightarrow A$ ?

$A$  :