CSE 2500 - Fall 2021 Exam I

First Name: _____ Last Name: _____

Peoplesoft ID: _____

The 1st In-class examination - 20% of final grade

Exam duration: 60 minutes
This examination has 3 questions. Answer all 3 questions. This examination has 4 pages.

Please do not write below this line.

Question:	1	2	3	Total
Points:	40	30	30	100
Score:				

1. (a) [20 points] Write the converse, inverse and contrapositive of the following statement.

$$(p \wedge r \rightarrow z) \rightarrow (q \leftarrow (\neg z \vee r))$$

(b) [20 points] Use a truth table to determine whether the following argument form is valid or invalid. Indicate which columns represent the premises and which represent the conclusion, and include a sentence explaining how the truth table supports your answer. (Hint: an argument form is valid if and only if the conclusion is true for every critical line.)

$$p \rightarrow (q \rightarrow r)$$
$$q \leftarrow p \vee r$$
$$\therefore p \rightarrow r$$

2. (a) [15 points] Express the statement "No white elephants are carnivores" as a *formal* logical expression involving predicates, quantifiers, and logical connectives with a domain consisting of all *animals* (not all elephants). Also, your answer should properly take into consideration that not all elphants are white.

(b) [15 points] Write the negation for the statement in part a, above. Please give both the informal statement as well as the formal statement with predicates and quantifiers.

3. (a) [15 points] Is the following argument valid or invalid? Justify your answer.

Every nonzero real number has a reciprocal.
Zero does not have a reciprocal.
Therefore, zero is not a nonzero real number.

(b) [15 points] Consider the statement, “Somebody is older than everybody." Rewrite this statement in the form “$\exists$ a person x such that $\forall$ _____.

End of exam