

Identify the subsume relations among the following structural adequacy criteria (consider the inline definition given below, and find additional information in Chapter 12 of the book):

- branch coverage: execute each branch (edge of the CFG)
- simple condition coverage: execute each simple condition with both true and false values
- compound condition coverage: execute each decision with each combination of truth values that participate in the

The subsume relations among the following structural adequacy criteria are:

- 1- Simple condition coverage subsumes branch coverage: Simple condition coverage requires executing each simple condition with both true and false values, which implies that each branch is executed at least once. Therefore, simple condition coverage subsumes branch coverage. To satisfy simple condition coverage, we would need to execute the if-else statements inside the while loop with both true and false values for the conditions. For example, we could set the value of 'c' to '+' and then to any other character that is not '+', to ensure that both branches of the first if-else statement are executed.
- 2- Simple condition coverage subsumes branch coverage: Simple condition coverage requires executing each simple condition with both true and false values, which implies that each branch is executed at least once. Therefore, simple condition coverage subsumes branch coverage. To satisfy compound condition coverage, we would need to execute the if-else statements inside the while loop with all possible combinations of true and false values for the conditions. For example, we could set the value of 'c' to '+' and the values of digit\_high and digit\_low to valid and invalid values, to ensure that all possible decisions within the if-else statements are executed at least once.
- 3- Simple condition coverage subsumes branch coverage: Simple condition coverage requires executing each simple condition with both true and false values, which implies that each branch is executed at least once. Therefore, simple condition coverage subsumes branch coverage. To satisfy compound condition coverage, we would need to execute the if-else statements inside the while loop with all possible combinations of true and false values for the conditions. For example, we could set the value of 'c' to '+' and the values of digit\_high and digit\_low to valid and invalid values, to ensure that all possible decisions within the if-else statements are executed at least once, which in turn would ensure that each branch in the code is executed at least once.