

Math 160A - Fall 2021 - Homework #2 - Due Wednesday, October 13,  
10:00pm

(Hand in by uploading to Gradescope)

1. Let  $A$  be a formula that starts with an open parenthesis symbol and let  $B$  be a non-empty, proper initial subexpression of  $A$ . Prove that  $B$  contains more open parentheses than close parentheses. [This is the same as the corrected version of Theorem II.43 in the PDF text. The proof of Theorem II.42 gives a template of how a proof by induction might look.]
2. Show
  - (a)  $\{\rightarrow, \oplus\}$  is adequate.
  - (b)  $\{\neg, Case\}$  is adequate.
3. Show that the ternary (3-ary) connective  $\{Case\}$  is not adequate.
4. We have shown that  $\{\downarrow\}$  and  $\{\downarrow\}$  are adequate. Prove that there is no other binary connective  $\circ$  such that  $\{\circ\}$  is adequate.