

# Homework#3 for ECE 152

## Computer Arithmetic (Chapter 3)

Hardcopy is due in class on Friday, February 22

- 1) [5 points] Patterson & Hennessy 3.7
- 2) [15] P&H 3.27
- 3) [10] P&H 3.31
- 4) [10] P&H 3.36
- 5) [5] P&H 3.39
- 6) [15] P&H 3.43
- 7) [5] Can you multiply an integer  $Z$  by 9 by shifting  $Z$  left by 3 bits and then adding  $Z$  to the result? What exceptions to this rule exist (i.e., when does the result not equal  $9Z$ )?
- 8) [10] Booth's algorithm for multiplication is faster than a non-Booth algorithm because it can speed up the cases in which the multiplier has 3 or more consecutive bits that are the same (either all zeros or all ones).
  - (a) Use Booth's algorithm to multiply 0110010 times 01101110. Show your work.
  - (b) Why do you think Booth's algorithm is, in general, preferable to non-Booth multiplication? Hint: think about why numbers might have long strings of identical bits.
- 9) [15] Write a program in a HLL (C, C++, or Java) that exposes the computer hardware's finite amount of precision. Explain how this program exposes the lack of precision. If you cannot figure out how to expose the lack of precision, then explain how you think the compiler is out-smarting you. In either case, please submit the code in hardcopy (it should be short!), not electronically. Please also submit the program output; if the output isn't what you were hoping for, show both the "ideal" and actual outputs.