

Study Questions for Patterson & Hennessey, Sections 3.3-5

Section 3.3

Addition: know how `addu` and `add` differ in terms of error handling.

This is the section that has the exception program counter (`epc`) and `cause` registers, which I discussed in an earlier class, but didn't put on Exam 1 because you didn't have this study sheet for this section.

Question to test your understanding: Why would you want (via a `mfc0 $k0`) to copy the `epc` in the first place? And why copy it into `$k0` instead of another possible register?

Section 3.4

Multiplication: know the MIPS instructions `mult`, `multu`, `mfhi`, `mflo`, and the pseudo-op `mul`.

What I did with addition, this section does with multiplication. Namely, it explains a naive algorithm for multiplying, and then explains an improved version, and then explains an even more improved version. You should understand all three versions.

We will not get to multiplication of signed numbers, and the role that sign extension can play in the improved algorithm.

Section 3.5

Initially, all you are supposed to know from this section is: `div`, `divu`, `mflo`, `mfhi`.

Eventually, be able to describe the naive and an improved algorithm for division.

Appendix B.6 (on CD ROM). You need only skim it. In lecture, I do a clearer job than the text on this section. Know the terms “ripple adder” and “carry look-ahead adder,” and be prepared to be able to explain how many steps the latter has in comparison with the former.