Review Problem 12

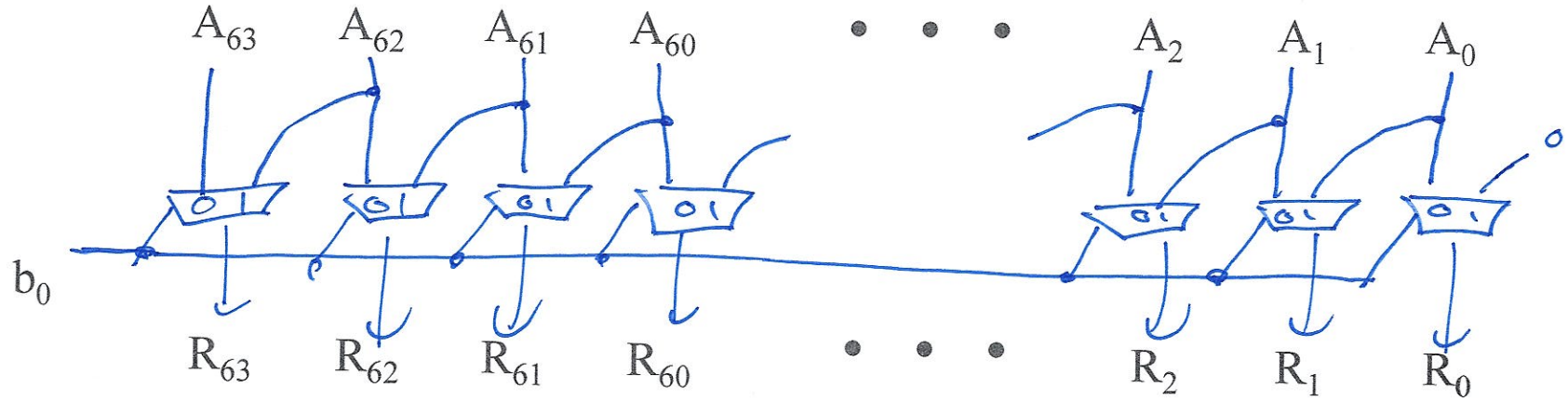
- How would the ALU's flags be used to help with each of the following branches? The first is filled in for you:
  - B.EQ: SUBS X31, <val1>, <val2>; use zero flag
  - B.NE: " " " " ; $\overline{\text{Zero}}$
  - B.GE: " " " " ; $\overline{\text{Negative} \oplus \text{overflow}}$
  - B.GT: " " " " ; $\overline{(\text{Negative} \oplus \text{overflow})}$ & $\overline{\text{zero}}$
  - B.LE: " " " " ; $\text{Negative} \oplus \text{overflow} \mid \text{Zero}$
  - B.LT: " " " " ; $\text{Negative} \oplus \text{overflow}$

LSL dest, A, #5

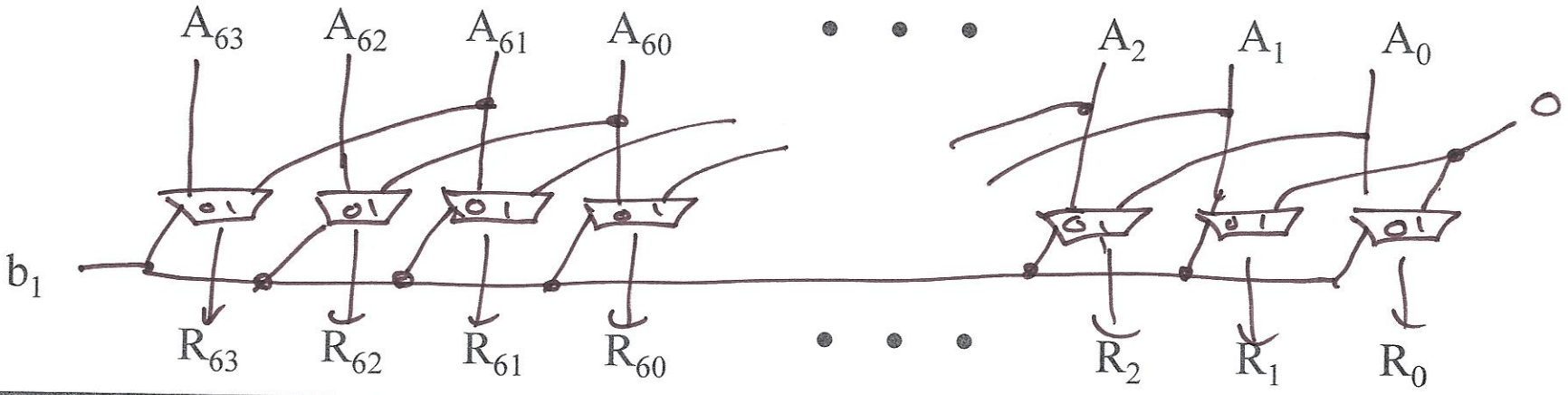
Shifter

Support shift operations: (A << 001101)

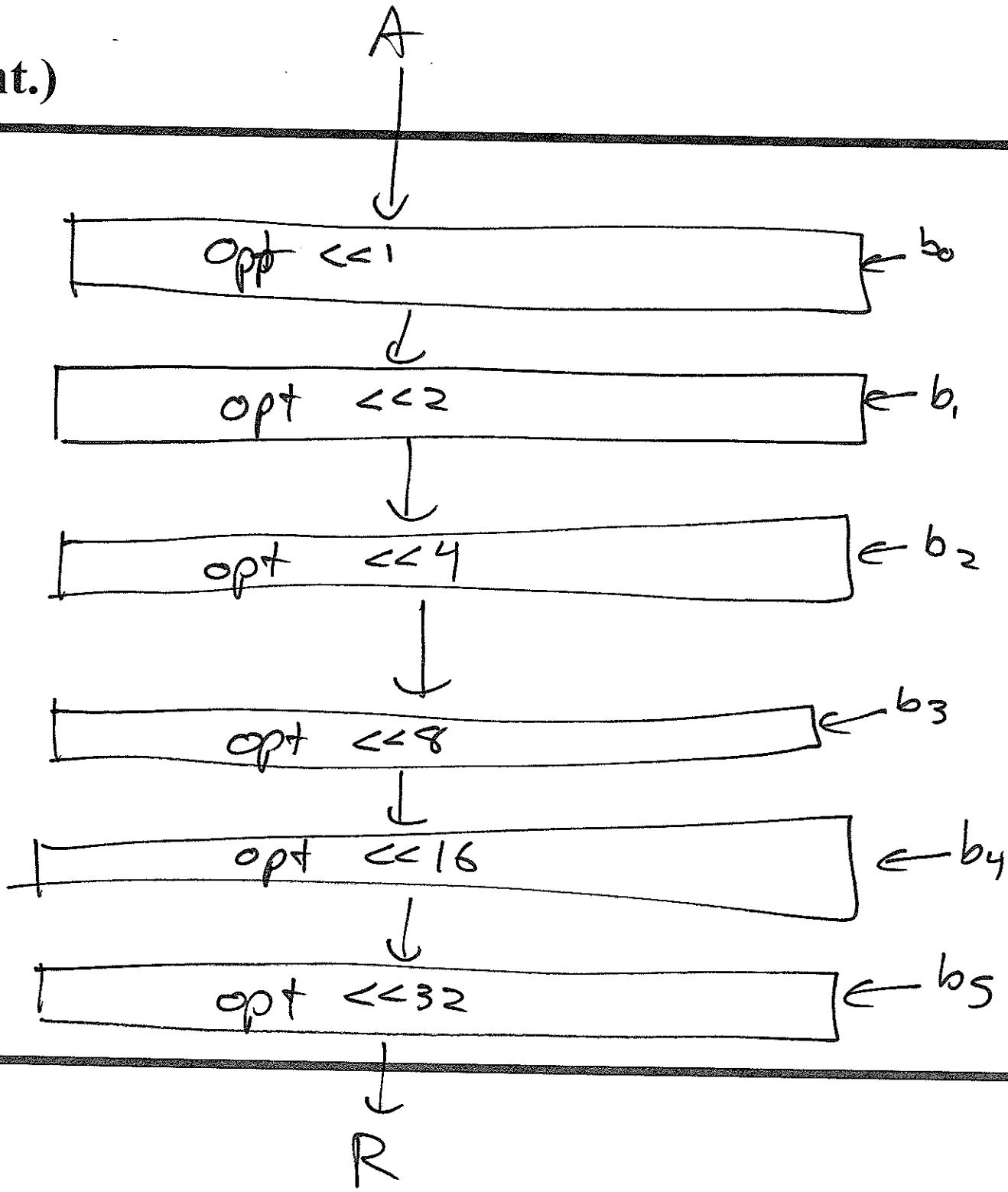
Optional shift by one: (A << b_0)



Optional shift by two: (A << b_1)

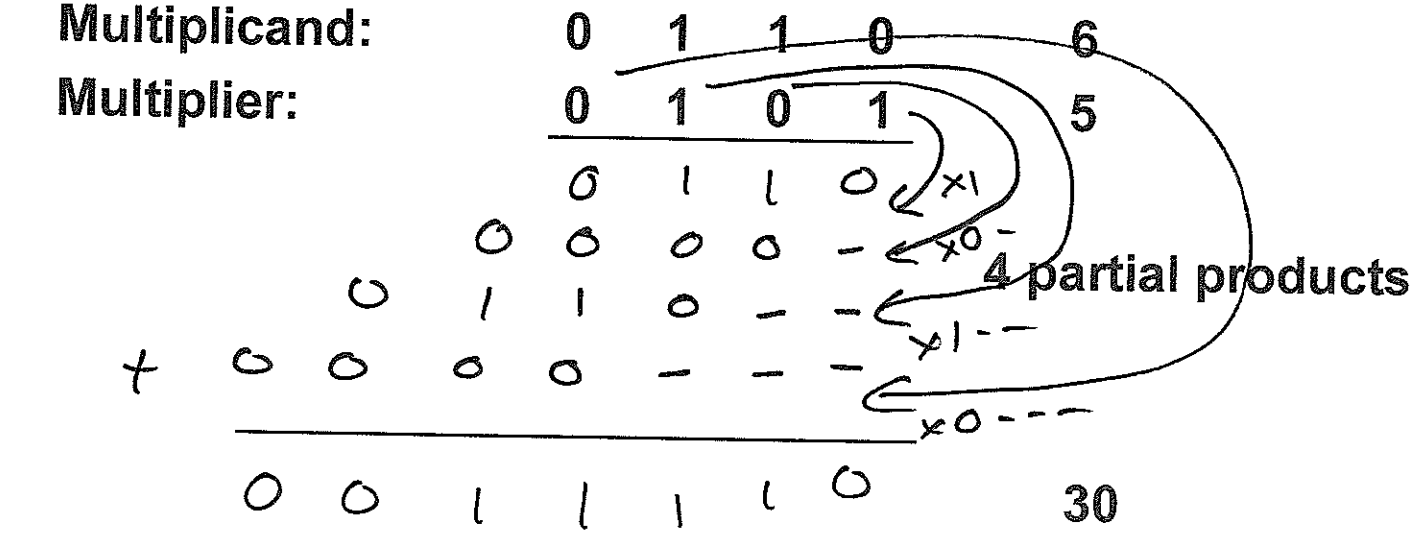


Shifter (cont.)



Multiplication

Example

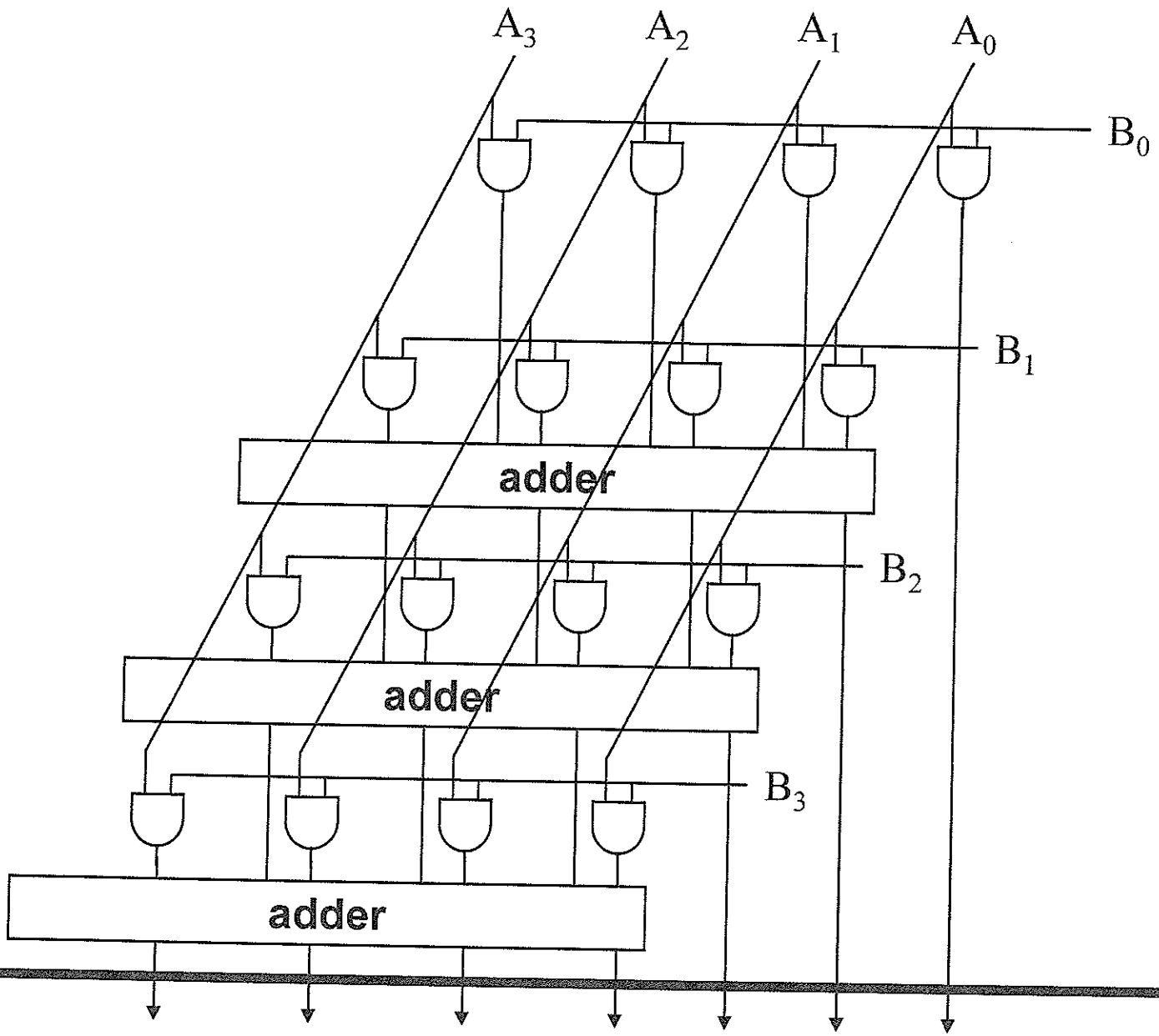


Repeat n times:

Compute partial product; shift; add

NOTE: Each bit of partial products is just an AND operation

Parallel Multipliers



Computer "Performance"

Readings: 1.6-1.8

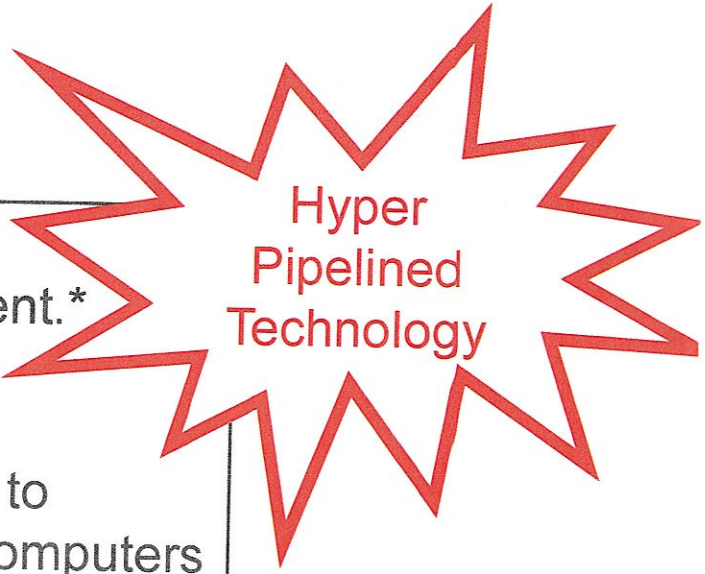
BIPS (Billion Instructions Per Second) vs. GHz (Giga Cycles Per Second)

Throughput (jobs/seconds) vs. Latency (time to complete a job)

Measuring "best" in a computer

The PowerBook G4 outguns Pentium III-based notebooks by up to 30 percent.*

* Based on Adobe Photoshop tests comparing a 500MHz PowerBook G4 to 850MHz Pentium III-based portable computers



Performance Example: Homebuilders

Builder	Time per House	Houses Per Month	House Options	Dollars Per House
Self-build	24 months	1/24	Infinite	$200,000
Contractor	3 months	1	100	$400,000
Prefab	6 months	1,000	1	$250,000

Which is the "best" home builder?

- Homeowner on a budget? $/house
- Rebuilding Haiti? Houses per month
- Moving to wilds of Alaska? Time per house

Which is the "speediest" builder?

- ~~Lateney: how~~ fast is one house built?
- Throughput: how long will it take to build a large number of houses?