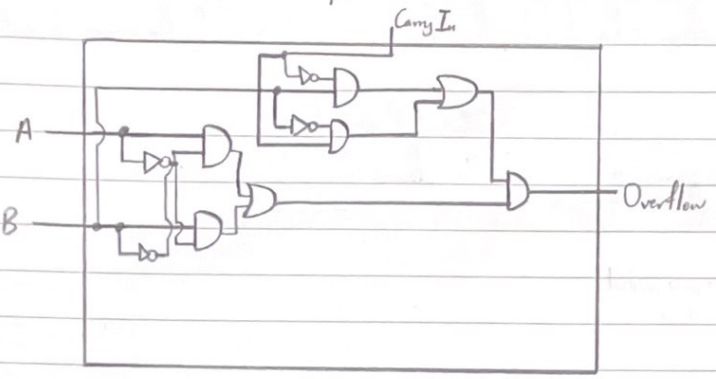
Saishnu Ramesh Kumar

Date: . .

CSCI113 - Lab 2

1) Overflow detection component



2) if ('carry-in to sign-bit' != 'carry-out from sign-bit') → overflow

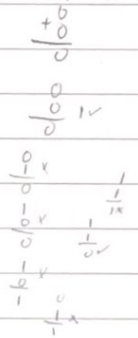
#1: if (sign of operand1 == sign of operand2)

if (sign of operand != sign of sum)

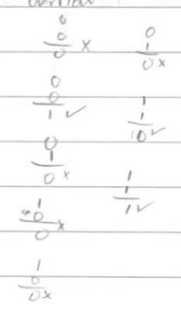
→ Overflow

Operand1	Operand2	Sum	#1	Overflow
0	0	0	0	0
0	0	1	1	1
0	1	0	0	0
1	0	0	0	0
1	0	1	0	0
0	1	1	0	0
1	1	0	1	1
1	1	1	0	0

#1

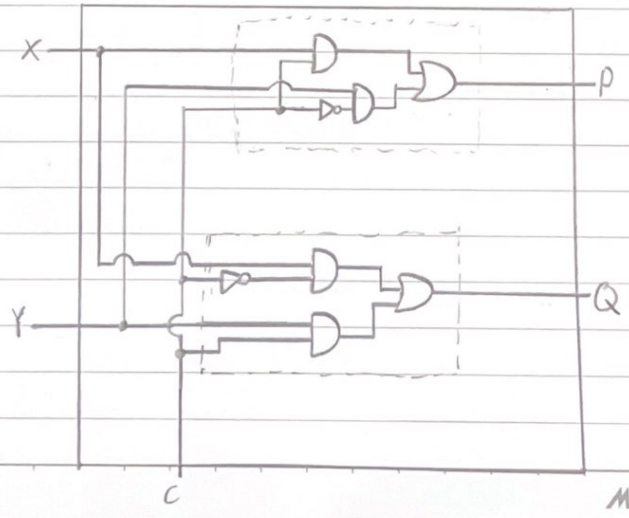


overflow



3) if C==0, X, Y → P, Q, crossing

if C==1, X, Y → P, Q, pass through



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4) Amdahl's Law: The law states that the overall performance improvement that is gained by optimising a single part of the system is limited by the fraction of time that the improved part is actually used.

30%, F.P instructions
70%, others

Formula: $\text{Speed} = \frac{1}{(1-P) + (P/N)}$

$(1-P)$: 100% - Parallel part; (P/N): Parallel part divided by N workers

Speed = 2
$P = 30\% = 0.3$
$N = ?$

$$2 = \frac{1}{(1-0.3) + \left(\frac{0.3}{N}\right)}$$

$$2\left(0.7 + \left(\frac{0.3}{N}\right)\right) = 1$$

$$1.4 + \frac{0.6}{N} = 1$$

$$\frac{0.6}{N} = 1 - 1.4$$

$$0.6 = -0.4N$$

$$-\frac{0.6}{0.4} = N$$

$$N = -1.5$$

∴ The speedup of the enhanced mode is -1.5. #