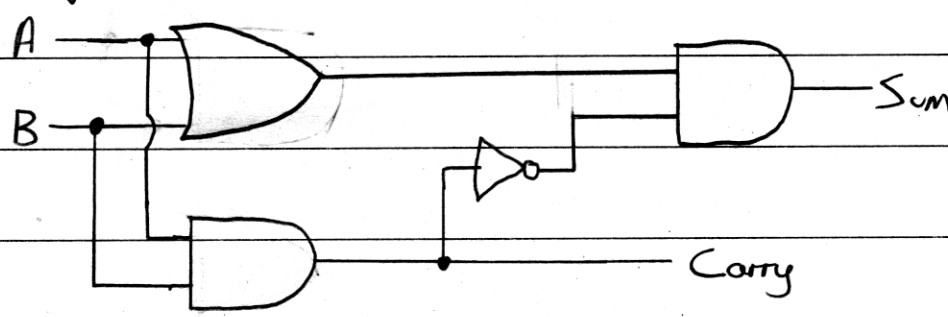
Q25

a)(i)

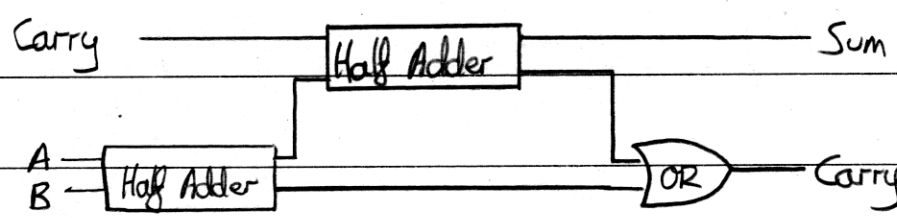
A	B	A AND B	A OR B	NOT (A AND B)	(A OR B) AND (NOT (A AND B))	C	S
0	0	0	0	1	0	0	0
0	1	0	1	1	1	0	1
1	0	0	1	1	1	0	1
1	1	1	1	0	0	1	0

(ii) A full-adder consists of two half-adders and an OR gate.

Half-adder:



Full-Adder:



b) Integers are represented by full numbers (eg 1, 5, 10) and are very limited in use. They only serve to provide simple calculations and/or provide approximate values for real

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~~Real~~ numbers. They can be inaccurate.
Floating point numbers are far more complex. They are represented with a mantissa (eg. 456.1234) and an exponent (eg. 09) creating a far more accurate representation of a real number. (456.1234+E09). They provide a far more accurate value than integers and can serve to provide infinitely more complex calculations.

c)(i) 0|1|0|1|0|0|1|0|1 - X movement
This first data bit is telling the car to turn right and go 2+16+32 = 50 millimetres in that X direction.
0|1|0|1|0|0|1|1|1 - Y movement.
The car is being instructed to go up a total of 1+2+16+64 = 83 millimetres.

(ii) (50+128)+(83+128) Start, stop bits N/A
= 178+211
= 389 - 377 (29×13)
= Remainder 12
∴ Checksum = 1100

(iii) BEGIN MoveCar (StringIn)
Get StringIn
Checksum_StringIn
IF Checksum = True THEN
READ # StringIn[X]
READ # StringIn[Y]
Move X
Move Y
~~ELSE SEND 'Retransmit StringIn'~~
~~ENDIF~~
ENDWHILE
END MoveCar (StringIn)

BEGIN StringIn_Extract
READ String_In
IF StringIn is correct length THEN
return StringIn
END

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BEGIN Checksum - StringIn
READ StringIn - Checksum