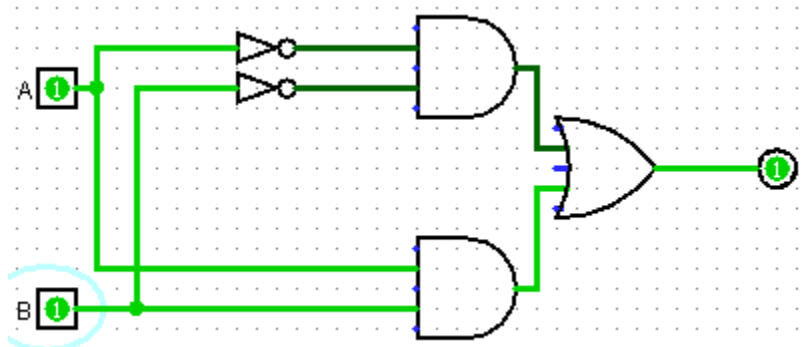Question 1:

a)  $(a + (c + b)) (b'c')'$
$(a + (c + b)) (b + c)''$ {Demorgan's Law}
$(a + (c + b)) (b + c)''$ {Double Complement}
$(b + c)((b + c) + a)$ {Communitive Law}
$(b + c)$ {Absorption Law}
$(b + c) \leftarrow$ Final form

b)  $(a'b)'(a'b')' + (ac)$
$(a + b') (a'b')' + (ac)$ {Demorgan's law}
$(a + b') (a + b) + (ac)$ {Demorgan's law}
$(a + \cancel{bb'}) + ac$ {Distributive law}
$a + ac$
$a$ {Absorption law}
$a \leftarrow$ Final form

Question 2:

| A | B | Output |
|---|---|--------|
| 1 | 1 | 1 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 0 | 0 | 1 |

a)
b)  $AB + A'B'$
c)  $(A+B)(A'+B')$



d)

Question 3:

Simplify for x_i:

$(d_1'd_0' b_i) + (d_1'd_0 b_i') + (d_1 d_0' b_i') + (d_1 d_0' b_i)$ {SUM OF PRODUCTS}

$(d_1' d_0' b_i) + (d_1' d_0 b_i') + (d_1 d_0')( \cancel{b_i + b_i'})$ {DISTRIBUTIVE LAW}

$(d_1' d_0' b_i) + (d_1' d_0 b_i') + (d_1 d_0') \leftarrow$ Final form

Simplify for c_in:

$(d_1' \, d_0 \, b_i') + (d_1' \, d_0 \, b_i) + (d_1 \, d_0 \, b_i') + (d_1 \, d_0 \, b_i)$ {SUM OF PRODUCTS}

$(d_1' \, d_0 \, b_i') + (d_1 \, d_0 \, b_i') + (d_1' \, d_0 \, b_i) + (d_1 \, d_0 \, b_i)$ {COMMUNITIVE LAW}

$((d_1'(d_0 \, b_i')) + (d_1 \, (d_0 \, b_i'))) + ((d_1'(d_0 \, b_i)) + (d_1 \, (d_0 \, b_i)))$ {ASSOCIATIVE LAW}

$(d_0 \, b_i')(\cancel{d_1'} + \cancel{d_1}) + (d_0 \, b_i)(\cancel{d_1'} + \cancel{d_1})$ {DISTRIBUTIVE LAW}

$(d_0)(\cancel{b_i'} + \cancel{b_i})$ {DISTRIBUTIVE LAW}

$d_0 \leftarrow$ Final form