Digital Electronics

a)

x_1 x_0	y_1 y_0	C	z_1 z_0
0 0	0 0	0	0 0
0 0	0 1	0	0 1
0 0	1 0	0	1 0
0 0	1 1	0	1 1
0 1	0 0	0	0 1
0 1	0 1	0	1 0
0 1	1 0	0	1 1
0 1	1 1	1	0 0
1 0	0 0	0	1 0
1 0	0 1	0	1 1
1 0	1 0	1	0 0
1 0	1 1	1	0 1
1 1	0 0	0	1 1
1 1	0 1	1	0 0
1 1	1 0	1	0 1
1 1	1 1	1	1 0

etc.

result 3τ after inputs present.

b) 5 outputs   each of   8 variables
   so certainly less than $5 \times \dfrac{2^8}{2} = 5 \times 2^7$

c) ripple adders, carry lookahead (some description
   of propagate, generate)

d)

x_1	x_0	y_1	y_2	$\not z$	w_3	w_2	w_1	w_0
0	0	0	0		0	0	0	0
0	0	0	1		0	0	0	0
0	0	1	0		0	0	0	0
0	0	1	1		0	0	0	0
0	1	0	0		0	0	0	0
0	1	0	1		0	0	0	1
0	1	1	0		0	0	1	0
0	1	1	1		0	0	1	1
1	0	0	0		0	0	0	0
1	0	0	1		0	0	1	0
1	0	1	0		0	1	0	0
1	0	1	1		0	1	1	0
1	1	0	0		0	0	0	0
1	1	0	1		0	0	1	1
1	1	1	0		0	1	1	0
1	1	1	1		1	0	0	1

etc