Glitch 85 + 20 + State diag 10

CMPE 124 **TEST 2** **November 21, 2011**
Dr. Ozemek

Last Name _____ First Name _____

NOTE: All circuits must be presented according to the mixed logic notations. If you make any assumption make sure you explain it. Circuit design must obey all the electrical characteristics of the devices. Obey noise margin rules. You can always use 7404. TTL Manual is not a notebook.

151. Use a mux (74153) to design the following function.
Signal assignments are: X, Y, F is active high and W active low.

$F = (x \oplus y \oplus z)w$ (-5)

2. Design a two-bit counter that counts the following sequence: 00-11-10-01. This counter should have an input x to start and stop the counting at any state. It should generate an output when the count reaches state 01 (S1). When the power is turned on the state machine should start from state 11 (S3). Use D flip-flops 74LS74.

a. Show the state diagram ✓
10 b. Show the ASM chart ✓ (-5)
15 c. Show the transition table ✓
15 d. Drive the equations
10 e. Show the circuit diagram
10 f. Show the necessary circuits and calculations so that state machine will start from S3. PS and CLR needs to be kept active for at least 30 ns if needs to be used. (-5)
10 g. For two clock period show the timing diagram.

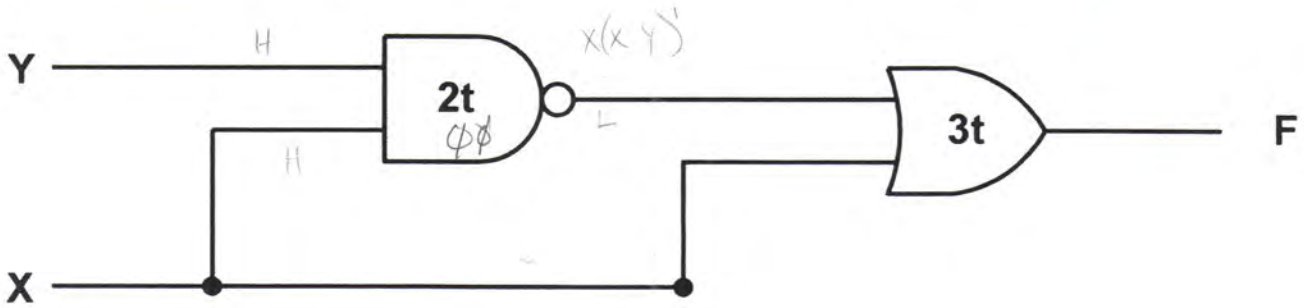
A CREDIT:

3. Below a digital circuit is given. All signals are active high.

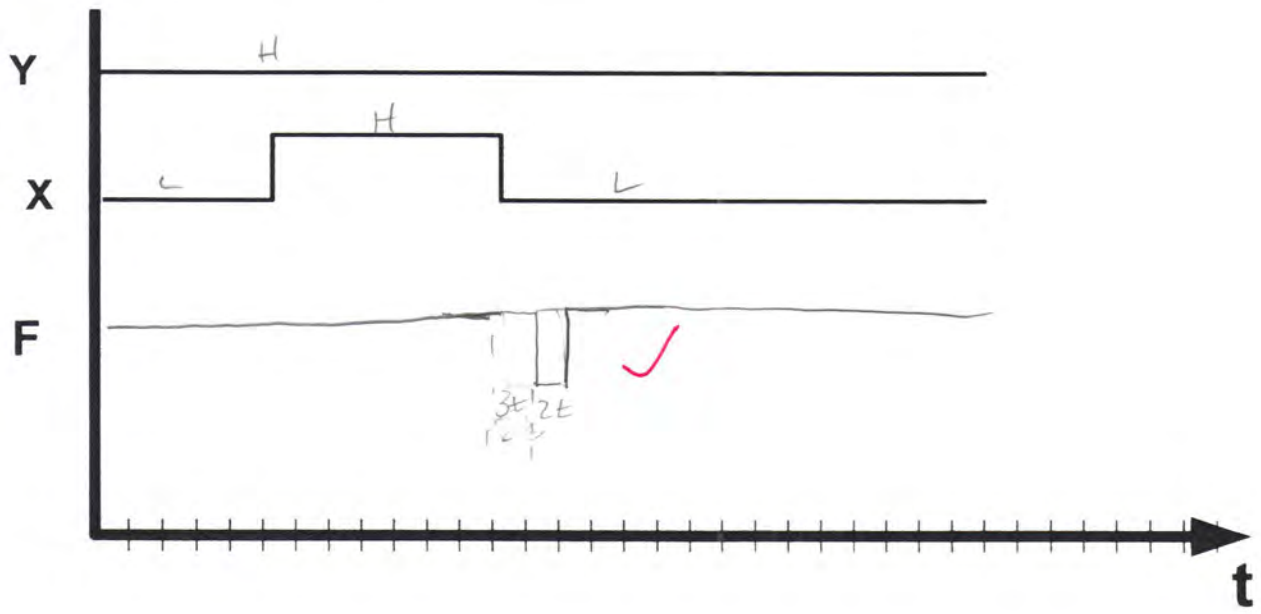
a) Would the circuit generate a glitch? Explain your answer. (Hint: first write the equation)

Yes, because the equation is $F = (xy)' + x = x' + y' + x$; which should be y, but since the x & y have to experience a 2t delay through the $\phi\phi$, whenever x switches from high to low, given y is high during that time $(xy)'$ will remain at L for 2t, giving an output of Low, where it should be High

b) Draw the timing diagram for F.

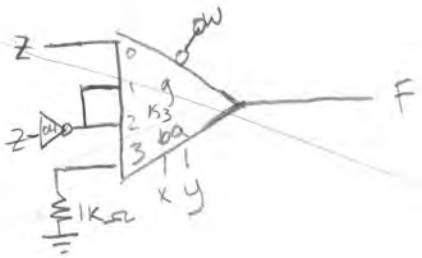


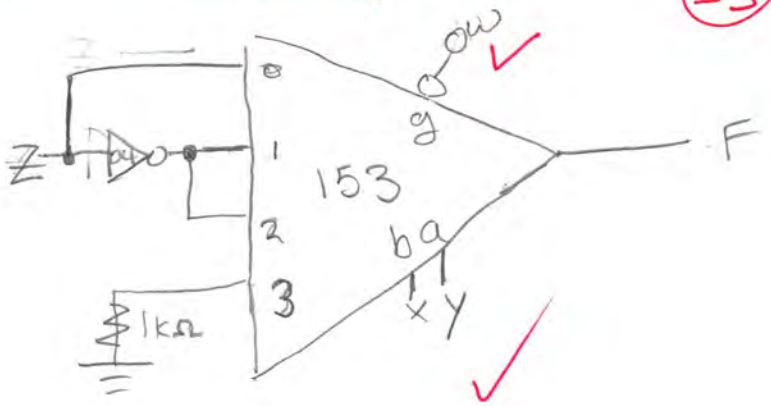
2t of Low signal 3t of



1) $F = (x'y'z' + x'yz' + x'y'z)w + xyz$ — missing

$z'(xy')$





-5

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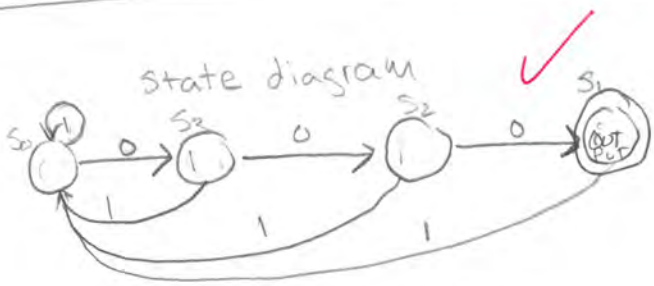
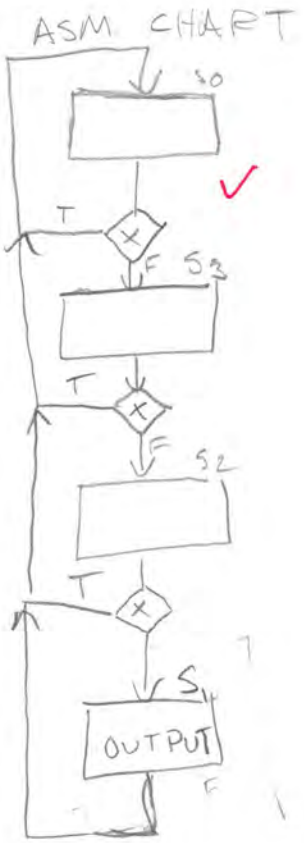
2) a)



x resets counting

b)



you are RESETting. it should ~~step~~ loop on any given State.

-5

2) c)

Q_1	Q_0	X	D_1	D_0	OUTPUT
0	0	0	1	1	0
0	0	1	0	0	0
0	1	–	0	0	1
1	0	0	0	1	0
1	0	1	0	0	0
1	1	0	1	0	0
1	1	1	0	0	0

TRANSITION TABLE

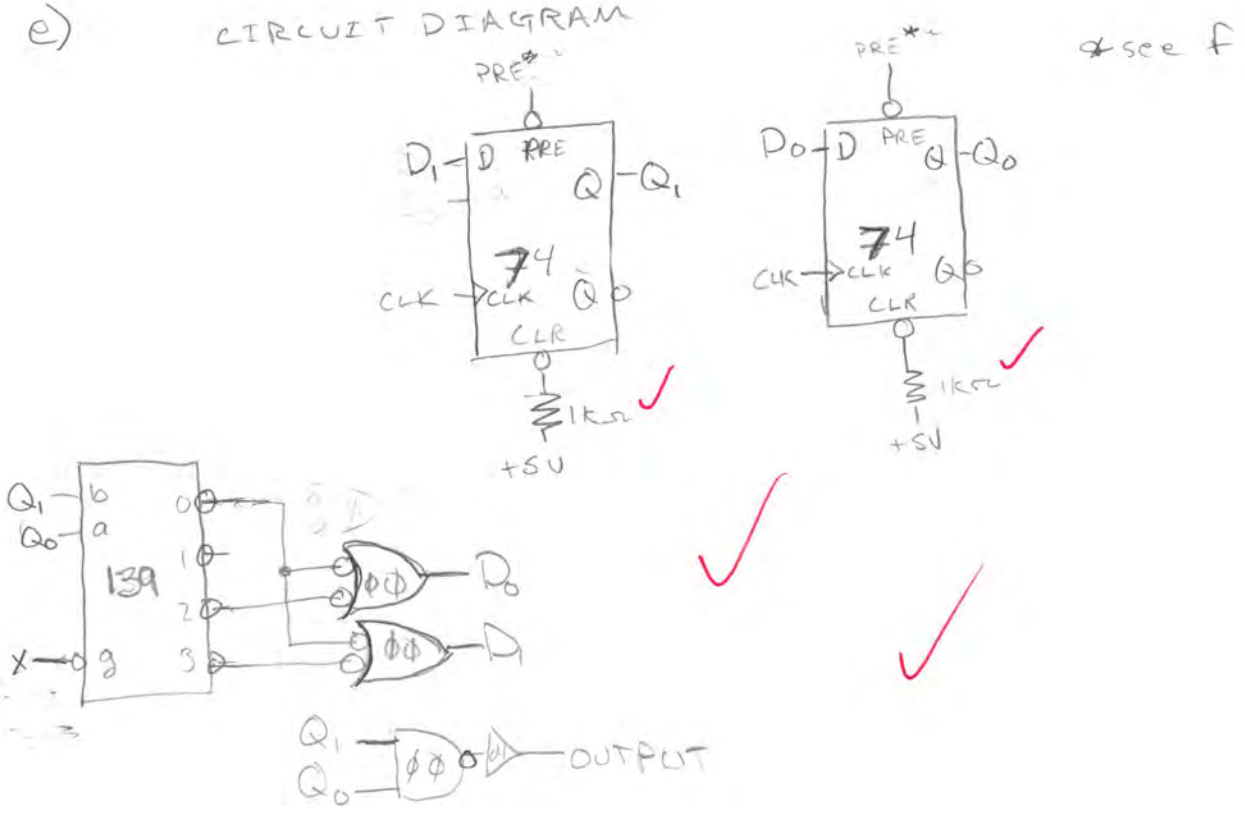
d) EQUATIONS

$D_1 = Q_1' Q_0' x' + Q_1 Q_0 x'$ ✓

$D_0 = Q_1' Q_0' x' + Q_1 Q_0' x'$ ✓

$OUTPUT = Q_1' Q_0$ ✓

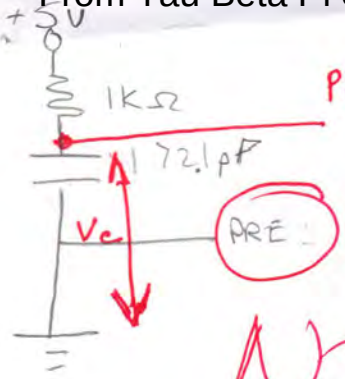
e) CIRCUIT DIAGRAM



✓ ✓ ✓ ✓ ✓ ✓ ✓

* see f

f)



PRE $5(1-e^{\frac{-30ns}{R(pF)}}) = .8$

$.16 = 1 - e^{\frac{-30ns \times 10^3}{R\,pF}}$

$e^{\frac{-30ns \times 10^3}{R\,pF}} = .84$

$R = 172\ k\Omega$

-5

NO

you should apply the V_c

Assume $R = 1k\Omega$

$5(1-e^{\frac{-30ns}{RC}}) = .8V$

$.16 = 1 - e^{\frac{-30ns}{1k\Omega C}}$

$e^{\frac{-30ns}{(1k\Omega)C}} = .84$

$-\frac{30ns}{(1k\Omega)(C)} = \ln .84$

$C_{max} = C = \frac{-30ns}{1k\Omega(\ln .84)} = 172.1pf$

$n = 10^{-9}$

$m = 10^{-3}$

$\mu = 10^{-6}$

$n = 10^{-9}$

$p = 10^{-12}$

(9)