Name: **Id#**

COE 405, Term 021

Design & Modeling of Digital Systems

Quiz# 3

Date: Saturday, Nov. 9, 2002

Q.1. Given the following signal assignments, show all transactions placed on each signal. At each event, show transactions that are appended, overwritten, and expired including those occurring at delta time. Show resulting waveforms on each signal.

```
Architecture dataflow of signals IS
  Type qit IS ('0', '1' , 'Z', 'X');
  Signal A, B, C: qit := '0';
Begin
  A <= '1' after 10ns, '0' after 20ns;
  B <= 'Z', A after 25ns, '0' after 35ns;
  C <= '1', A after 5 ns, B after 20 ns;
End dataflow;
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	0ns	0+δ	0+2δ	5ns	10ns	10+δ	15ns	20ns
	0	0	0	0	1	1	1	0
a	(1, 10ns) (0/ 20)	(1/10) (0/20)	(1/10) (0/20)	(1/5) (0/15)	(0/10)	(0/10)	(0/5)	—
	0	Z	Z	Z	Z	Z	Z	Z
b	(2/5) (0/25) (0/35)	(0/25) (0/35)	(0/25) (0/35)	(0/20) (0/30)	~~(0/15)~~ ~~(0/25)~~ (2/5) (1/25) (0/35)	(1/25) (0/35)	(1/20) (0/30)	~~(1/15)~~ ~~(0/25)~~ (2/5) (0/25) (0/35)
	0	1	1	0	0	1	1	1
c	(1/5) (0/5) (0/20)	~~(0/5)~~ ~~(0/20)~~ (1/5) (0/5) (2/20)	(0/5) (2/20)	(2/15)	~~(2/10)~~ (1/5) (1/5) (2/20)	(1/5) (2/20)	(2/15)	~~(2/10)~~ (1/5) (0/5) (2/20)

	20+δ	25	40	45	45+δ	50	55	65
	o	o	o	o	o	o	o	o
a	—	—	—	—	—	—	—	—
	z	z	z	o	o	o	o	o
b	(0,25)	(0,20)	(0,5)	(0,10)	(0,10)	(0,5)	—	—
	(0,35)	(0,30)	(0,15)					
	1	o	z	z	1	o	o	o
c	(0,5)	(2,15)	—	(1,δ)	(0,5)	(0,15)	(0,10)	—
	(2,20)			(0,5)	(0,20)			
				(0,20)				

a

0ns 10ns 20ns

b

0ns 45ns

c

0ns 5ns 10ns 25ns 40ns 45ns 50ns