Jonathan W. Valvano November 12, 2003, 1 to 1:50pm

**(30) Question 1.** Let $t_1$ be the E clock period with stretching. **$t_{DW}$ is 100ns.**

WDA = (106, $t_1$ + 20 )

the rise of **CS1** occurs at $t_1$ + [0,10], so

WDR = ($t_1$ + [0,10]-100,$t_1$ + [0,10] )

To make it WDA overlap WDR, we need

$106 = t_1 + [0,10]-100$

or

$206 = t_1$

which is 1 stretch (makes $t_1$ = 250ns).

**(15) Question 2**.

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*(short *)0x0910 = *(short *)0xFFEE;
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**(25) Question 3**.

**(10) Part a)** Start with

**y(n) = (12x(n) + 92x(n-3) – 60y(n-2))/100**

then simplify to

**y(n) = (3x(n) + 23x(n-3) – 15y(n-2))/25**

**(5) Part b)** 3*511 + 23*511 – 15*-512 = 1533+11753+7680 = 20966

**`short` because it is less than 32767**

**(10) Part c)** Convert all terms to constants

**y = (3x + 23x – 15y)/25**

Solve for y/x

**25y = 3x + 23x – 15y**

**40y = 26x**

**y/x = 26/40 = 0.65**

**(30) Question 4.** Match input range of 0.5 to 1.0 into output range of 0 to 5.0.

**(10) Part a) $V_{out}$ = 10*($V_{in}$-0.5)** or **$V_{out}$ = 10*$V_{in}$-5**

**(20) Part b)**

Add $V_{ref}$ = 2.5V

**$V_{out}$ = 10*$V_{in}$-2*$V_{ref}$**

Add $V_g$ = 0V, to make sum of gains equal to 1

**$V_{out}$ = 10*$V_{in}$-2*$V_{ref}$ -7*$V_g$**

Chose $R_f$ = 140 kΩ, as the least common multiple of 10, 2, 7

Build