Initialization	D	0001.1010 000	
	$-D = \overline{D} + 1$	1110.0101 111	(+ 1 ulp)
	$WS_{-1} = X$	0001.0000 010	
	WC_{-1}	0000.0000 000	
Step 0:	WS_{-1}	0001.0000 010	
	WC_{-1}	0000.0000 00**1**	($W_{msbs} = 0001$ so $q_0 = 1$)
	$-q_0 D$	1110.0101 111	
	sum	1111.0101 100	$\ll 1$
	$carry$	0000.0000 110	$\ll 1$
Step 1:	WS_0	1110.1011 000	
	WC_0	0000.0001 10**0**	($W_{msbs} = 1110$ so $q_1 = -1$)
	$-q_1 D$	0001.1010 000	
	sum	1111.0000 100	$\ll 1$
	$carry$	0001.0110 000	$\ll 1$
Step 2:	WS_1	1110.0001 000	
	WC_1	0010.1100 00**1**	($W_{msbs} = 0000$ so $q_2 = 1$)
	$-q_2 D$	1110.0101 111	
	sum	0010.1000 110	$\ll 1$
	$carry$	1100.1010 010	$\ll 1$
Step 3:	WS_2	0101.0001 100	
	WC_2	1001.0100 10**0**	($W_{msbs} = 1110$ so $q_3 = -1$)
	$-q_3 D$	0001.1010 000	
	sum	1101.1111 000	
	$carry$	0010.0001 000	$sum + carry = 0$, terminate.
Terminate	Quotient	0.101	

X = 1.0110 011 (179/128)
D = 1.0011 000 (152/128)
Q = 1.0010 1101 0
D[1.3] = 1.001, so we use the “”1.001” column of chart 13.X. This means we select a quotient bit of 2 if the partial remainder is greater than or equal to 3.5, a quotient bit of 1 if the partial is greater or equal to than 1.0, a zero if the partial is greater than or equal to -1.5, -1 if the partial is greater than or equal to -3.75, and a -2 otherwise.

Initialization	D	0001.0011 000	
	$2D$	0010.0110 000	
	$-D = \overline{D} + 1$	1110.1100 111	(+ 1 ulp)
	$-2D = \overline{2D} + 1$	1101.1001 111	(+ 1 ulp)
	$X = WS$	0001.0110 011	
	WC	0000.0000 000	

Step 4:	WS	0001.0110 011	
	WC	0000.0000 00**1**	(RW_{msbs} = 0001.010 so $q_4 = 1$)
	$-q_7D$	1110.1100 111	
	WS	1111.1010 101	$\ll 2$
	WC	0000.1000 110	$\ll 2$

Step 3:	WS	1110.1010 100	
	WC	0010.0011 000	(RW_{msbs} = 0000.110 so $q_3 = 1$)
	$-q_6D$	0000.0000 000	
	WS	1100.1001 100	$\ll 2$
	WC	0100.0100 000	$\ll 2$

Step 2:	WS	0010.0110 000	
	WC	0001.0000 00**1**	(RW_{msbs} = 0011.010 so $q_2 = -1$)
	$-q_5D$	1110.0101 111	

page 269 306

Math for the recurrence relation

going to have to change notation for sure, change the subscripts for steps and might have to get rid of some exponents

$$\begin{aligned}
w[j+1] &= r^{j+1}\big(x - S[j+1]^2\big) \\
&= r^{j+1}\big(x - (S[j] + s_{j+1}r^{-(j+1)})^2\big) \\
&= r^{j+1}x - r^{j+1}\big(S[j]^2 + 2S[j]s_{j+1}r^{-(j+1)} + s_{j+1}^2 r^{-2(j+1)}\big) \\
&= r^{j+1}\big(x - S[j]^2\big) - \big(2S[j]s_{j+1} + s_{j+1}^2 r^{-(j+1)}\big) \\
&= rw[j] - \big(2S[j]s_{j+1} + s_{j+1}^2 r^{-(j+1)}\big) \\
&= rw[j] + F[j]
\end{aligned}$$

where

$$F[j] = -\big(2S[j]s_{j+1} + s_{j+1}^2 r^{-(j+1)}\big)$$

Since there is a term of S in the expression of F, we must come up with a way to represent S using only zeros and ones, rather than using the bit set $\{-a, \ldots, a\}$. This is done using on-the-fly conversion just as we did to compute the quotient for the divider. We keep a running copy of S, but we also keep the value $SM = S - 1$. The logic is still the same for computing S and SM on the next step; see figure 13.15.

Now that S is in a form such that we can use it in a CSA, we need to compute F. To do so,