1. **[Oppenheim/Schafer/Buck Problem #9.2]** The gain along the path shown is $W^0_N \cdot (-1) \cdot W^2_N = -W^2_N$. There is only one path between each input and each output sample. Part (c) is just tedious computation.

2. **[Oppenheim/Schafer/Buck Problem #9.3]** The input should be placed in $A[r]$ in bit-reversed order $(A[0], A[1], \ldots, A[7]) = (x[0], x[4], x[2], x[6], x[1], x[5], x[3], x[7])$. The output from $D[r]$ is normal order. If $x[n] = (-W_N)^n$, then

$$D[k] = \sum_{n=0}^{7} (-W_8)^n W_8^{nk}$$

$$= \sum_{n=0}^{7} (-1)^n W_8^{n(k+1)}$$

$$= \sum_{n=0}^{7} W_8^{-4n} W_8^{n(k+1)}$$

$$= \sum_{n=0}^{7} W_8^{n(k-3)}$$

Therefore, $D[k] = \delta[k - 3]$. More tedious computation shows that

$$C[k] = \begin{cases} 
\frac{D[k]+D[k+4]}{2} & \text{if } 0 \leq k < 4 \\
\frac{D[k-4]-D[k]}{2} \cdot W_8^{k-4} & \text{if } 4 \leq k < 8 
\end{cases}$$

Substitute for $D[k] = X[k]$.

3. **[Oppenheim/Schafer/Buck Problem #9.4]** In any stage, $N/2$ butterflies must be computed. There are $2^{m-1}$ different coefficients in the $m$’th stage. The difference equation is given by $y[n] = W_{2m}y[n-1] + x[n]$ has impulse response $h[n] = W_{2m}^n u[n]$. Noting that $W_{2m} = e^{-j2\pi/2^m}$, we see that $h[n]$ has period $2^m$. Therefore, the frequency of the oscillator is $2\pi/2^m$.

4. **[Oppenheim/Schafer/Buck Problem #9.6]** It is not possible to say. This could have come from either decimation in time or decimation in frequency.