

Discussion #6

(1) Narrow band input example

$$x(n) = x_{\max} \cos(\omega_0 n)$$

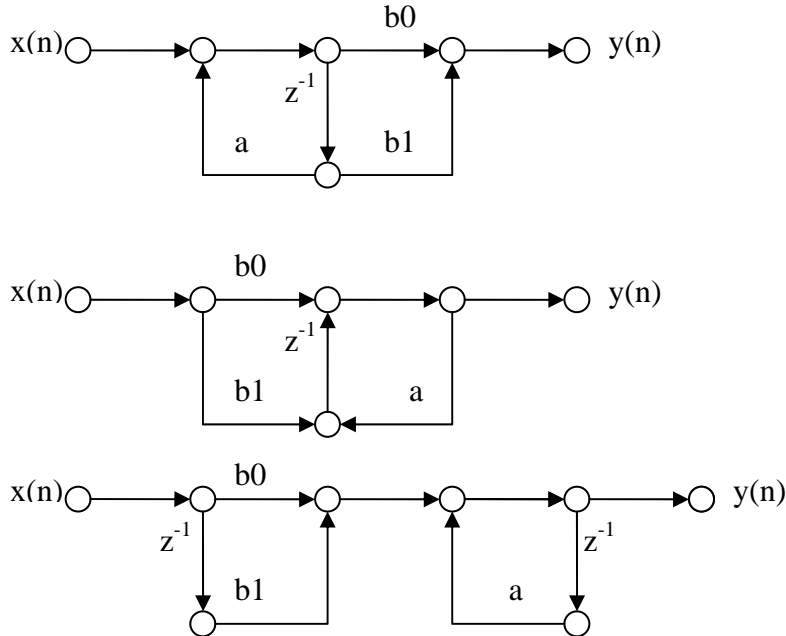
$H(\omega)$ is an LTI system, with real-valued impulse response. Find $y(n)$, the output of the system, with $x(n)$ as input.

(2) Scaling factor clarification

(3) Direct Form FIR round-off/scaling analysis

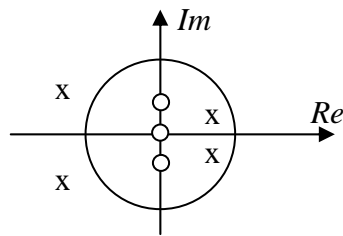
(4) More noise analysis example (adapted from Problem 6.42)

The networks below have the same system function. Assume that the systems are implemented using $(B+1)$ -bit fixed point arithmetic, and all products are rounded before additions are performed.



- Draw linear noise models for each of the systems.
- Two of the networks have the same total output noise power due to round-off. Without explicitly computing the output noise power, determine which two have the same output noise power.

(5) Review of LTI system and pole-zero plot (adapted from Problem 5.11)



The system function of a LTI system has the above pole-zero plot. Determine if each of the following is true, is false, or cannot be determined from the information given.

- The system is stable.
- The system is causal.
- If the system is causal, then it must be stable.
- If the system is stable, then it must have a two-sided impulse response.