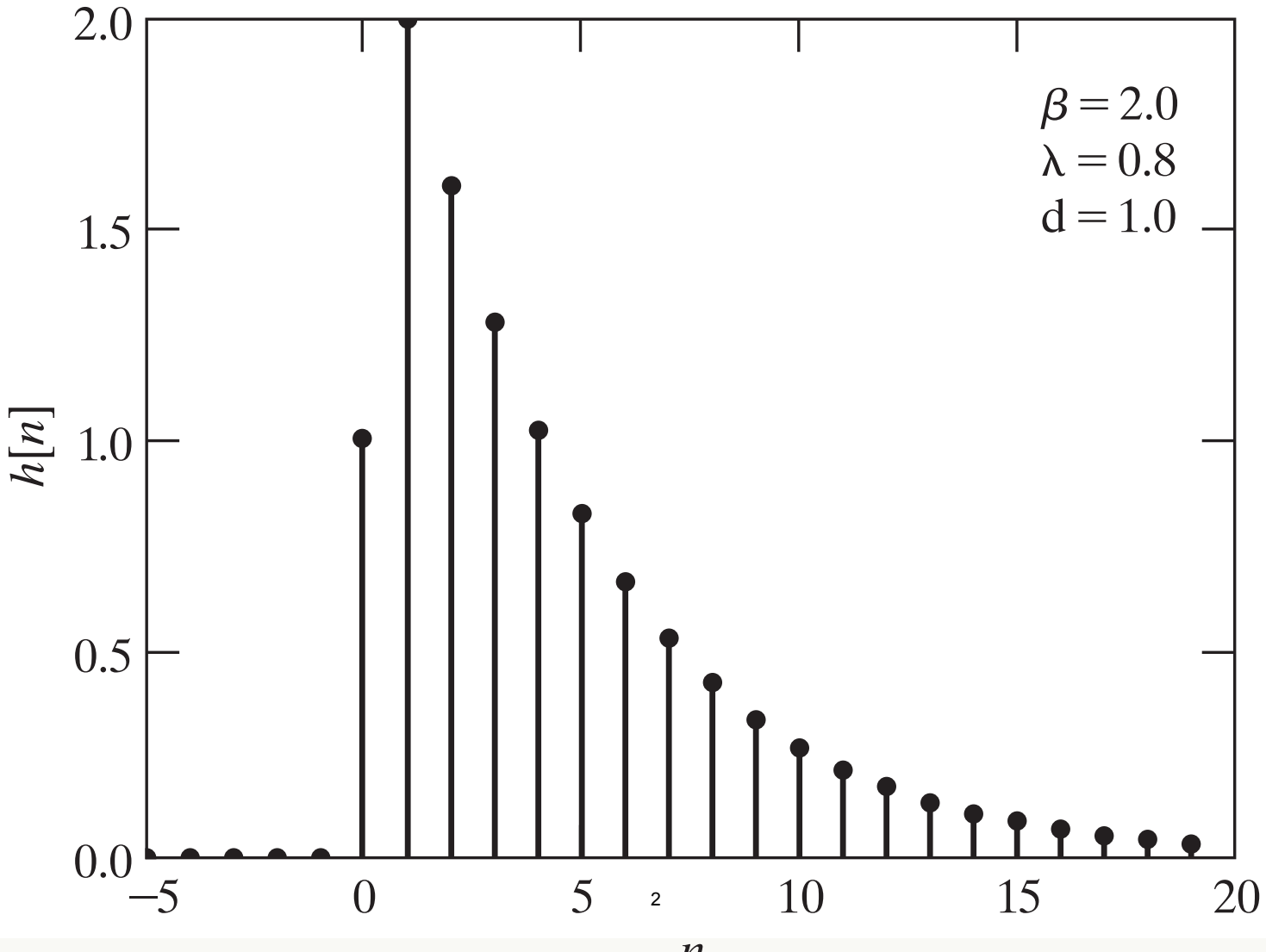
State-Space Models

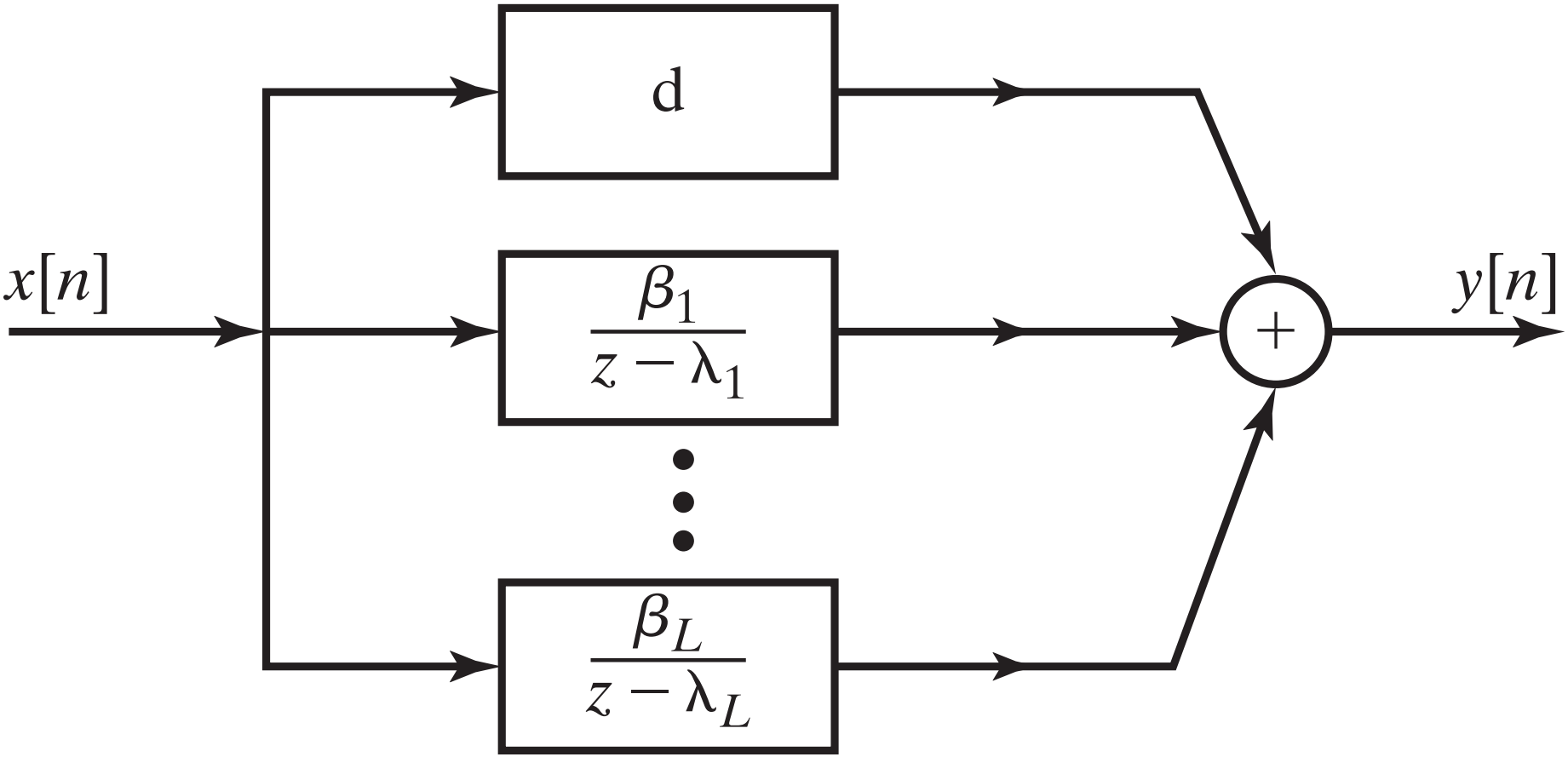
6.011, Spring 2018

Lec 4

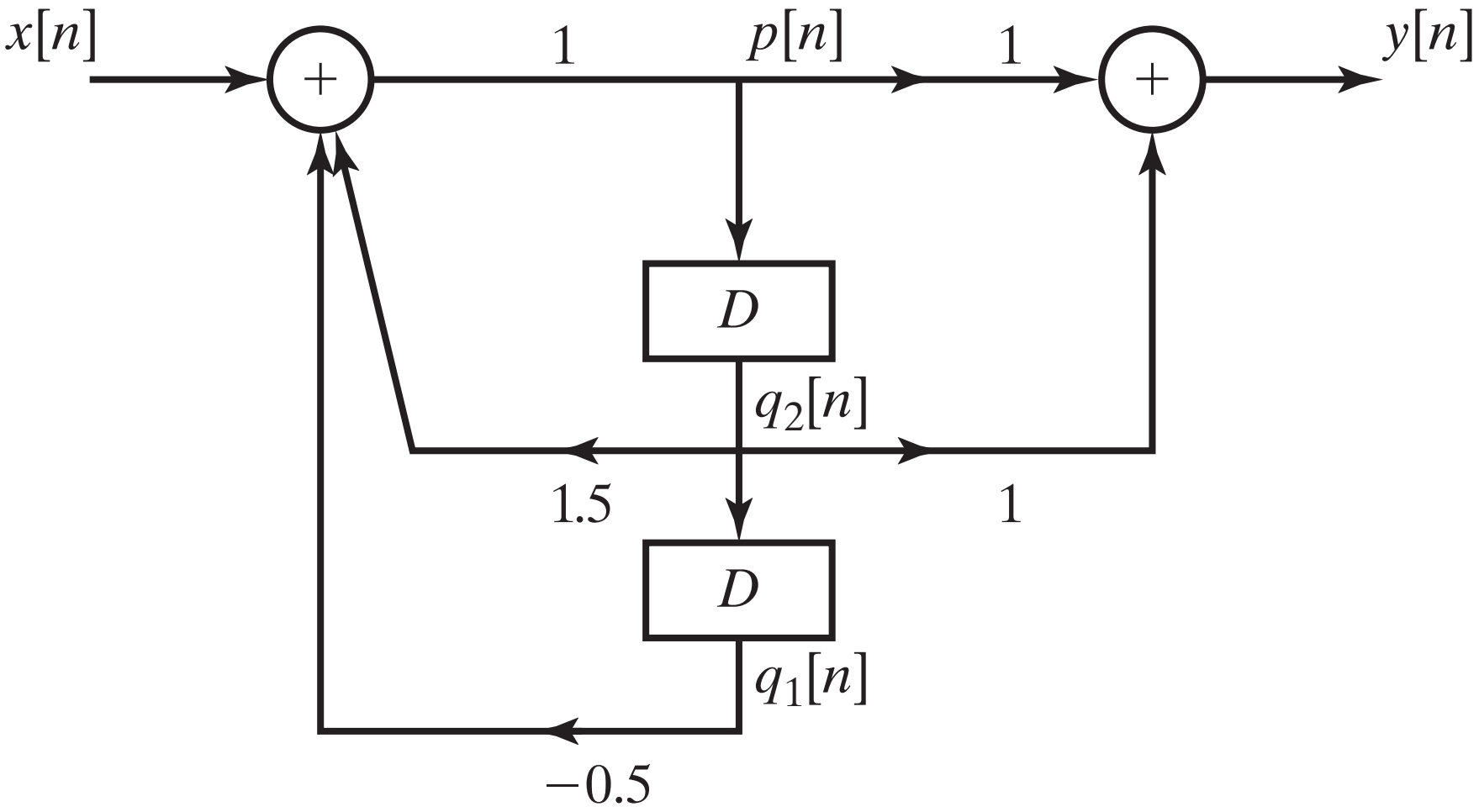
Exponential unit sample response
$h[n]= \beta \lambda^{n-1}u[n-1] + d\,\delta[n]$



General transfer function of a causal DT LTI system with distinct poles



Delay-adder-gain system



Defining properties of DT state-space models

$$\mathbf{q}[n+1] = \mathbf{f}\Big(\mathbf{q}[n], x[n], n\Big)$$

$$y[n] = g\Big(\mathbf{q}[n], x[n], n\Big)$$

- **State evolution property**
- **Instantaneous output property**

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