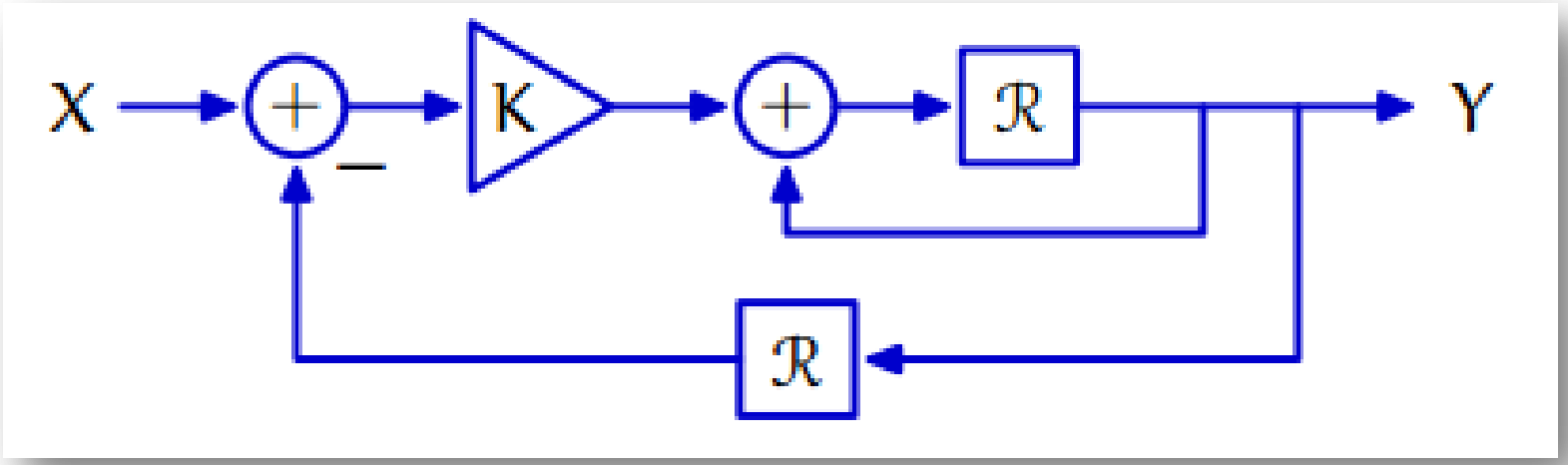
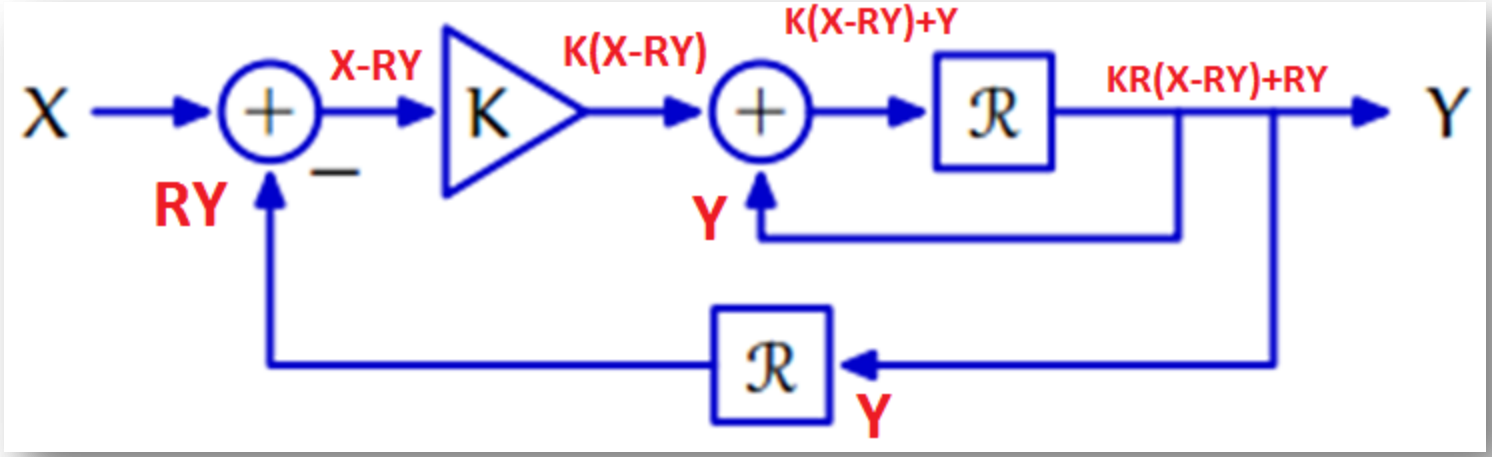
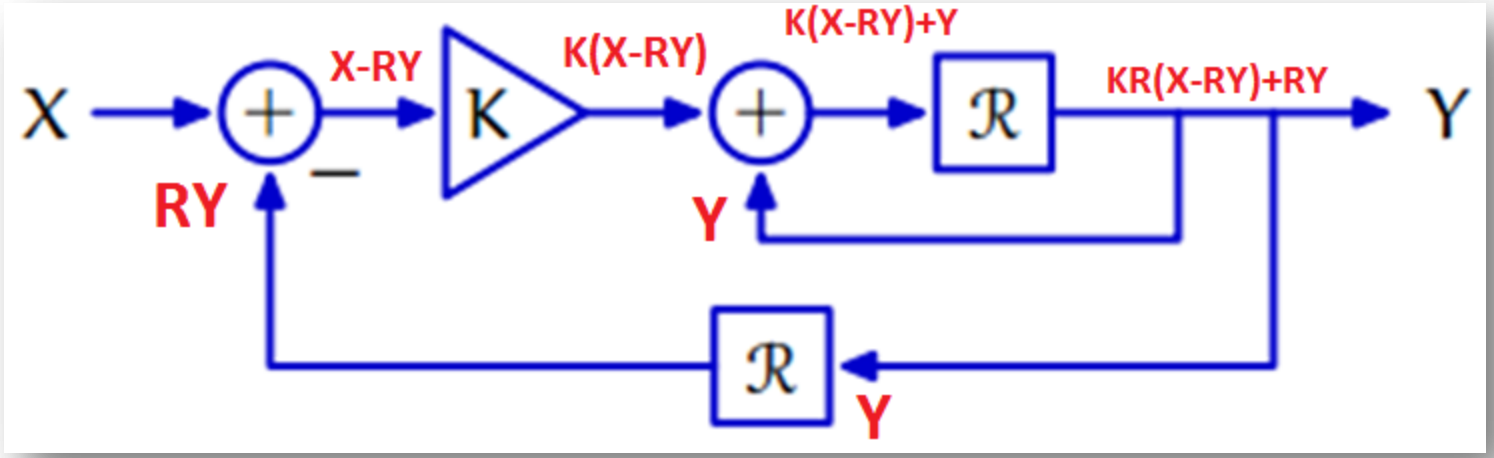
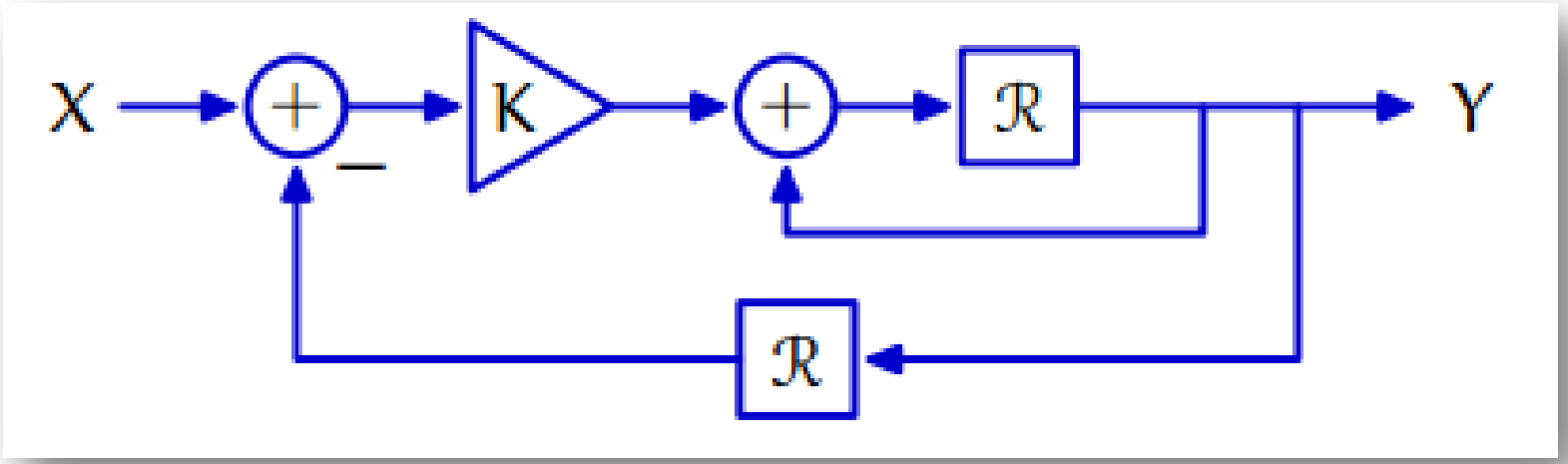

X
+
−
K
+
$\mathcal{R}$
Y
$\mathcal{R}$


X
X-RY
K
K(X-RY)
K(X-RY)+Y
KR(X-RY)+RY
Y
RY
Y
Y

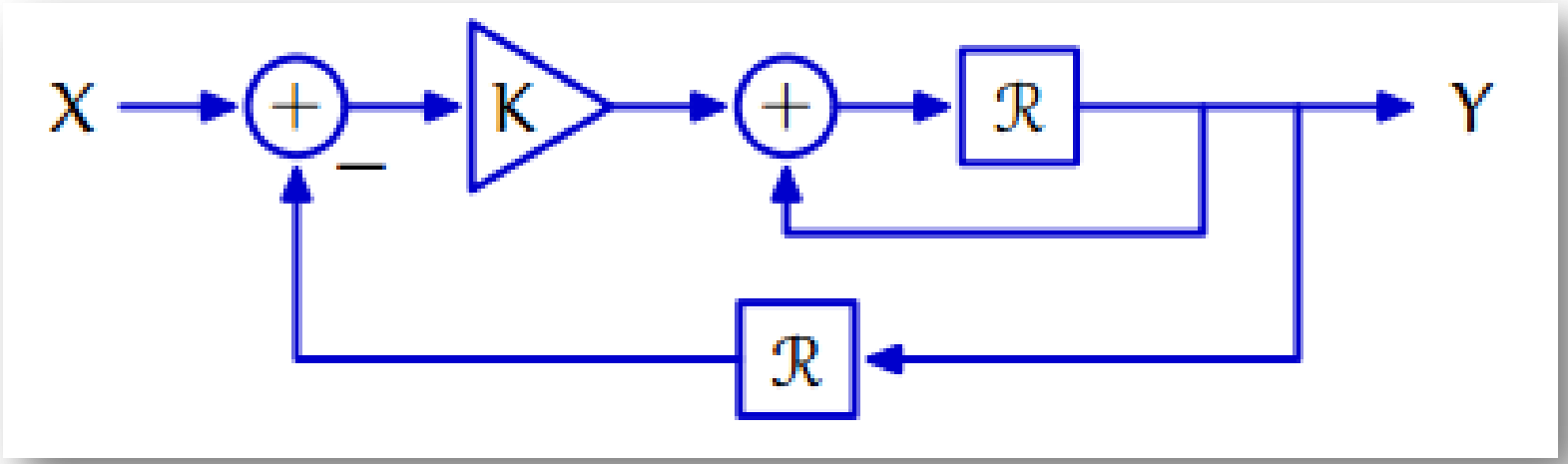


$$H(R) = \frac{Y}{X} = \frac{KR}{1 - R + KR^2}$$

DT LTI Systems are an important part of **6.01**



Analyzing Systems



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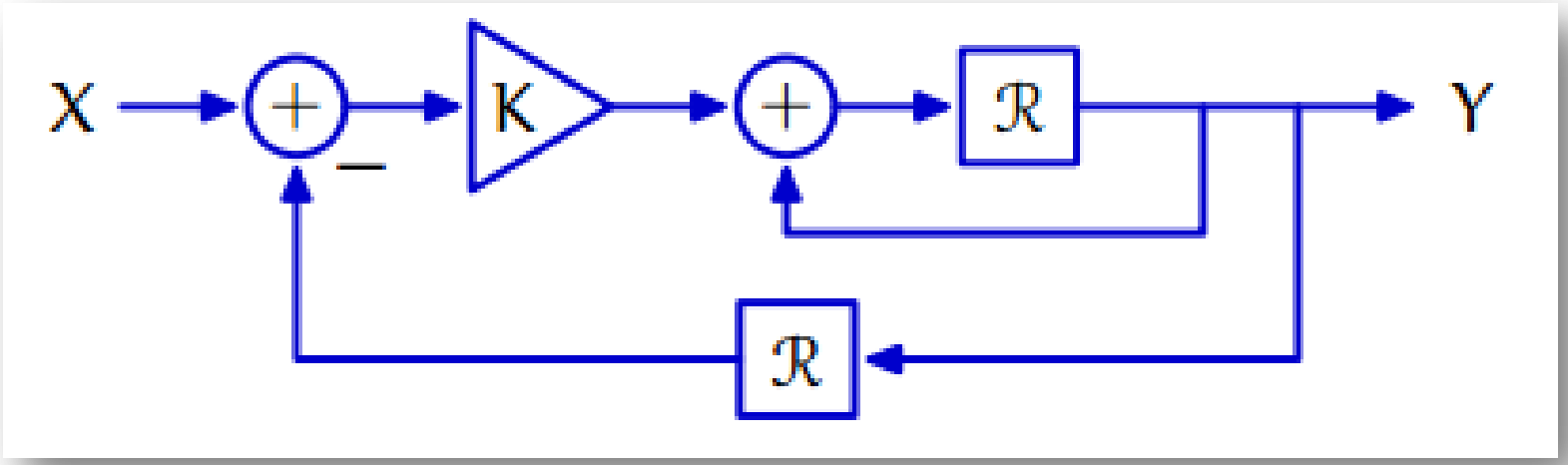
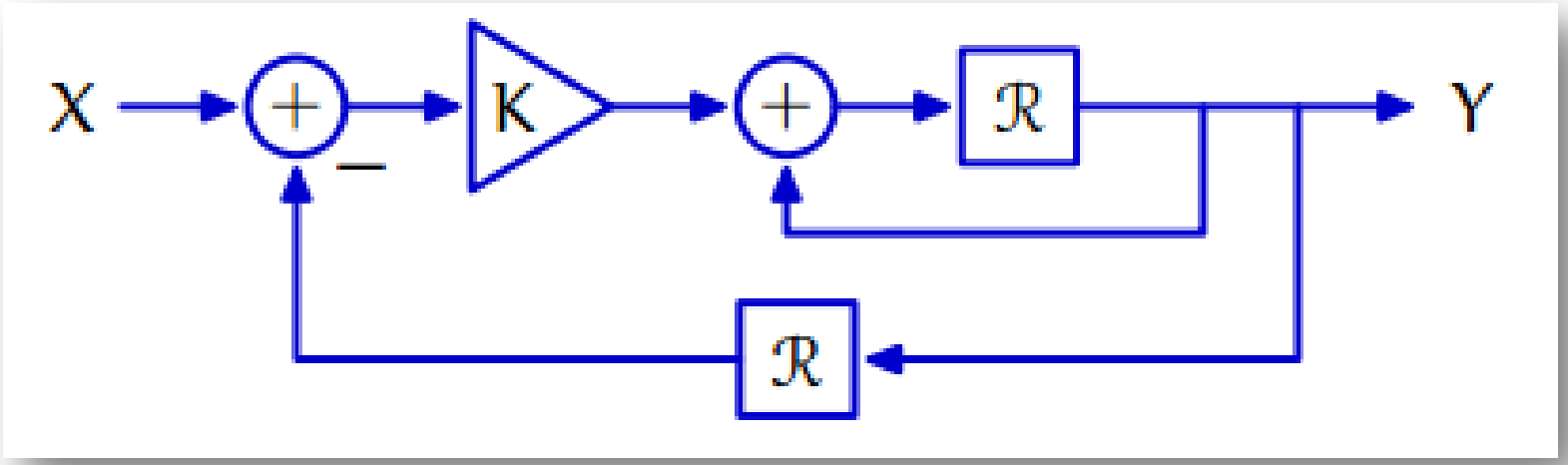
Analyzing Systems



$$H(R) = \frac{KR}{1 - R + KR^2} \qquad H(z) = \frac{Kz}{z^2 - z + K}$$

Analyzing Systems



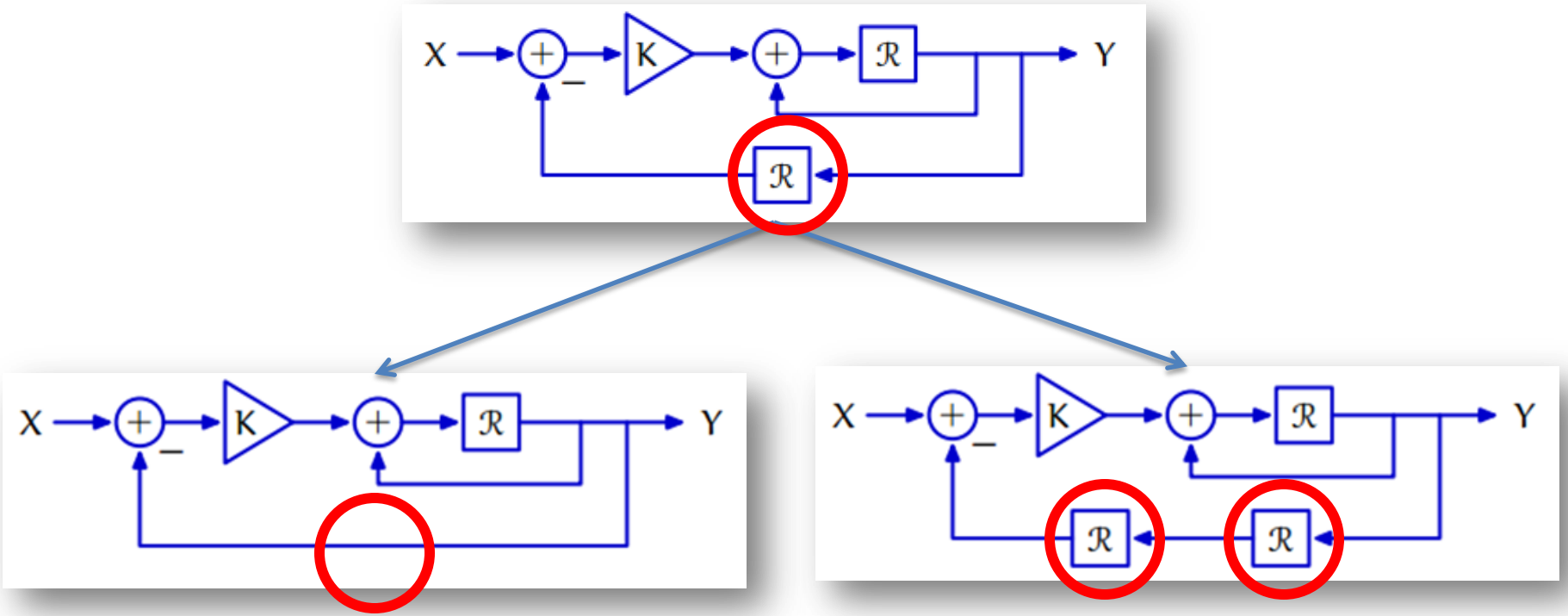
$$H(R) = \frac{KR}{1 - R + KR^2}$$

$$H(z) = \frac{Kz}{z^2 - z + K}$$

$$zeros - z = 0$$

$$poles - z = \frac{1 \pm \sqrt{1 - 4K}}{2}$$

Analyzing Systems

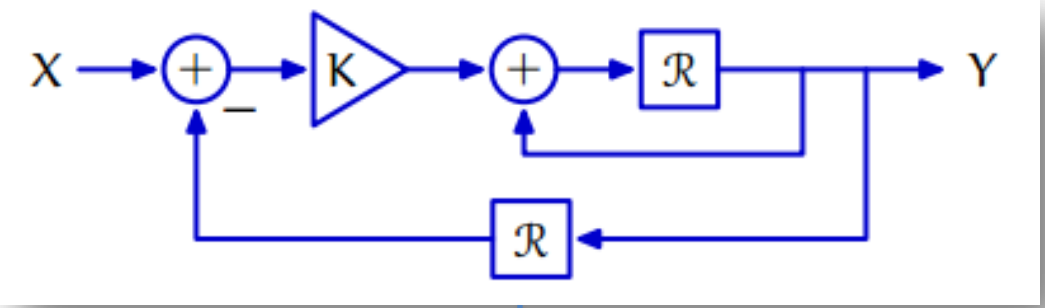


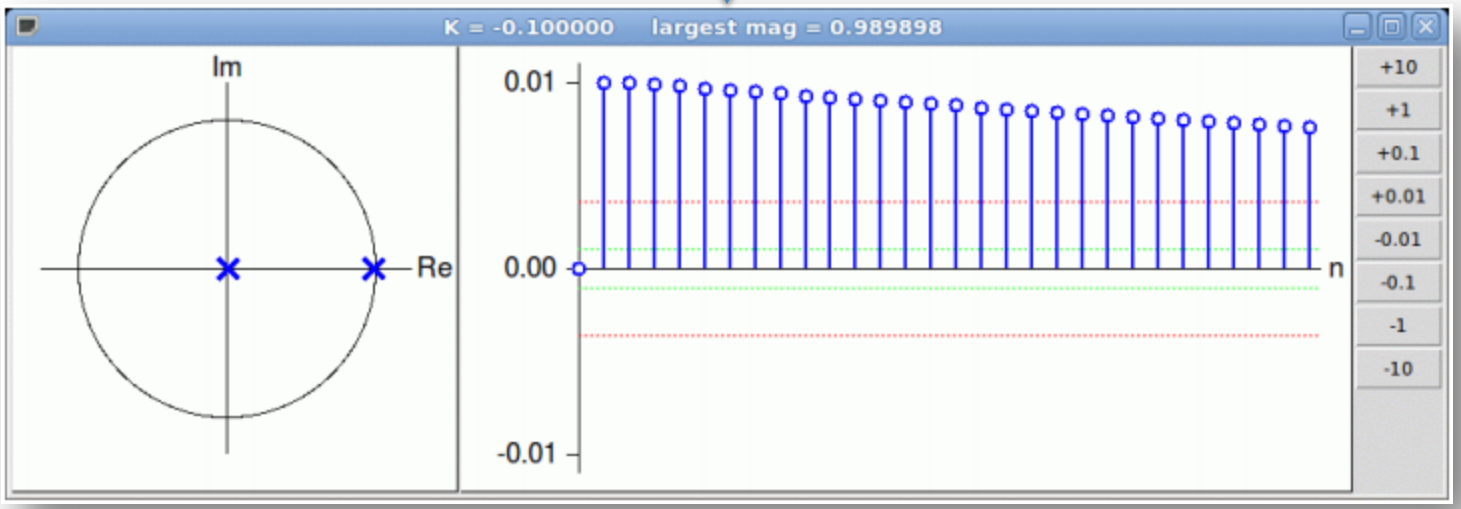
What changes?

Goal: help **6.01** students build up a good intuition for systems by building a tool that carries out system analysis.

What has already been done?

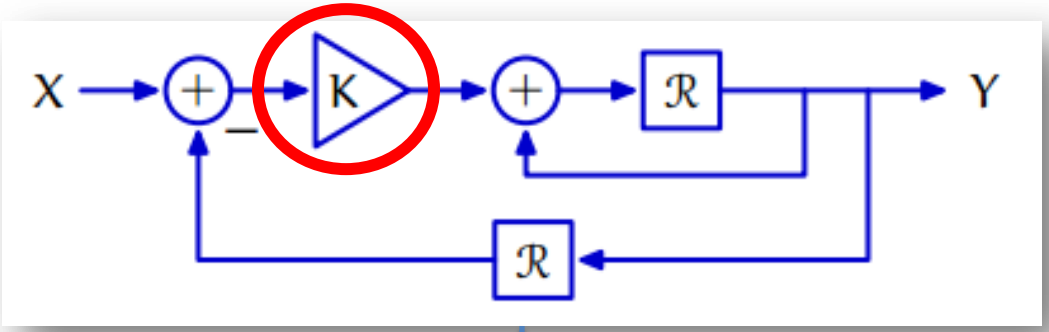
6.01 software lab 5



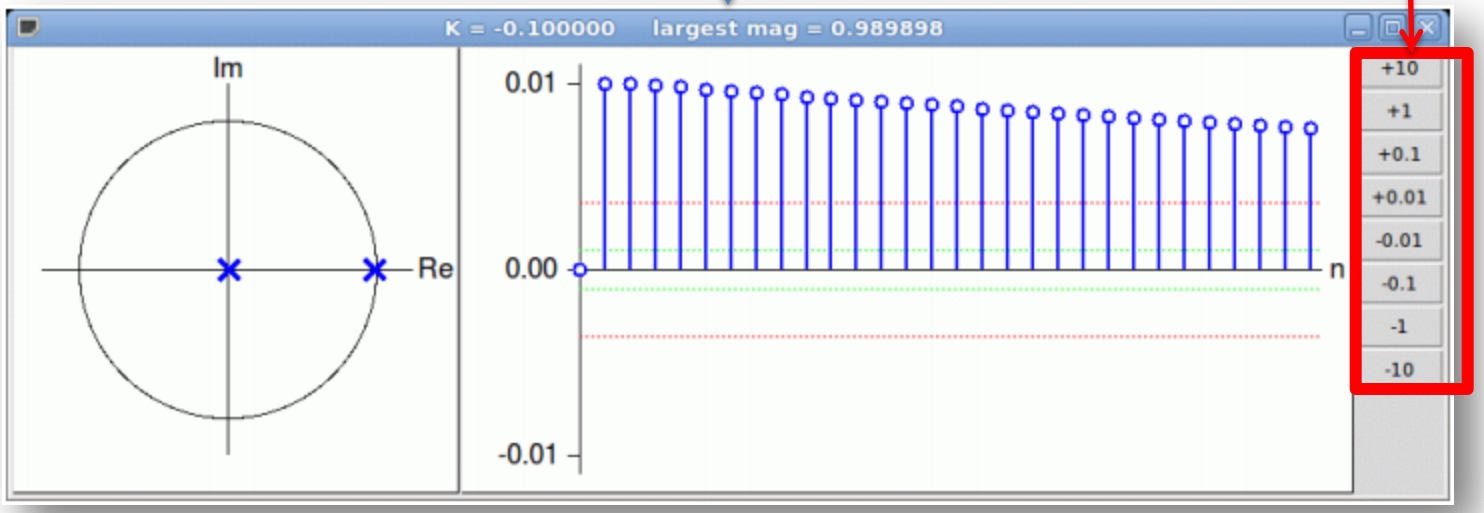


What has already been done?

6.01 software lab 5

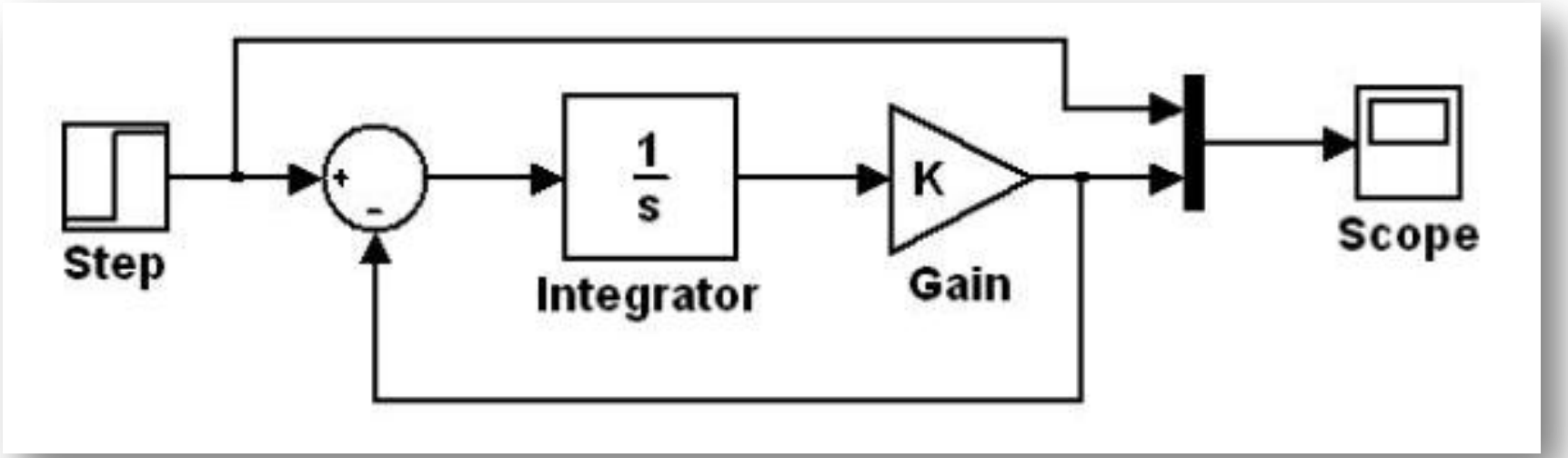


Tweak values of **K**.

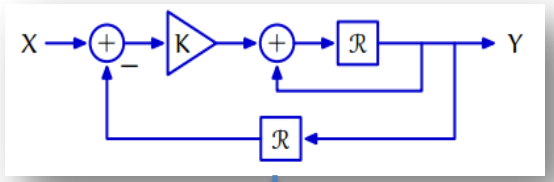


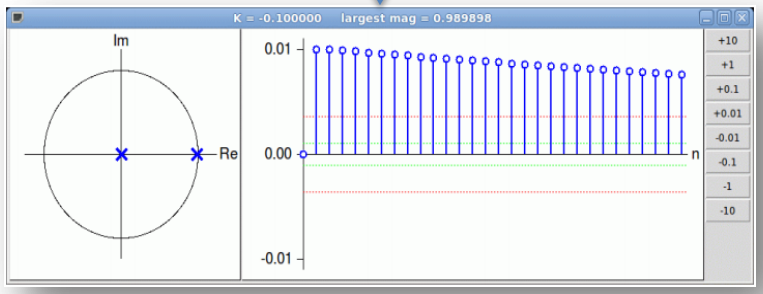
What has already been done?

MATLAB Simulink

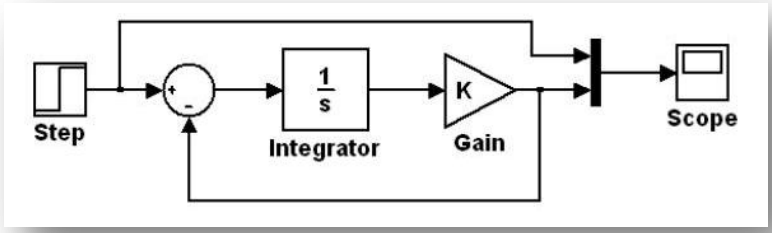


What has already been done?





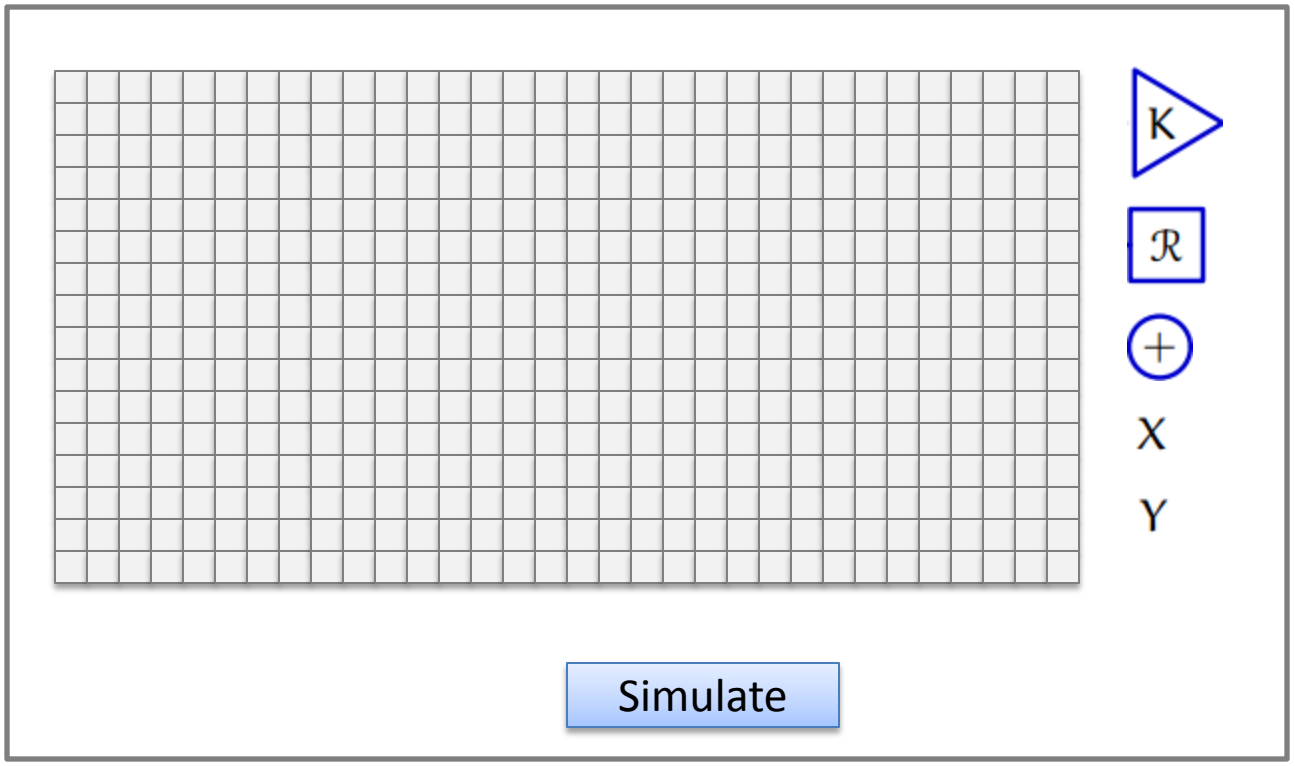
Too specific



Too general

New idea

Something in between



New idea

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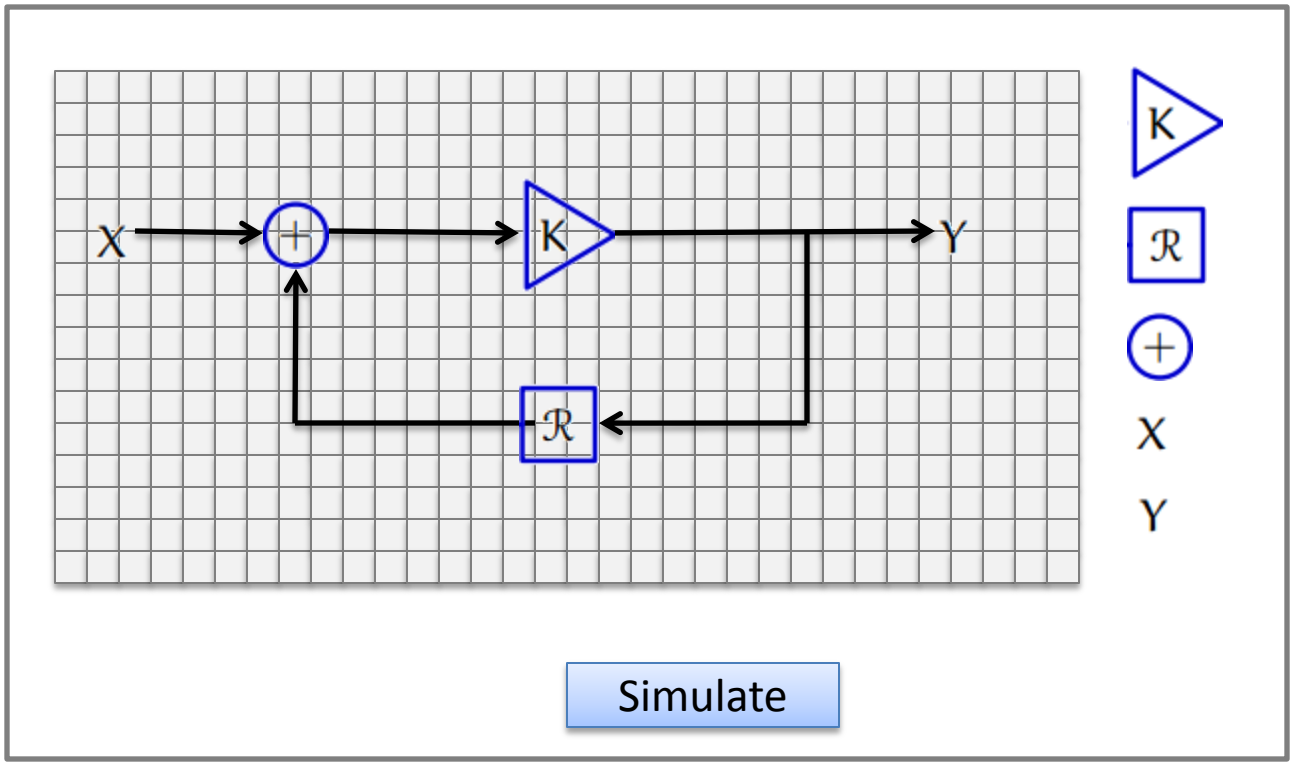
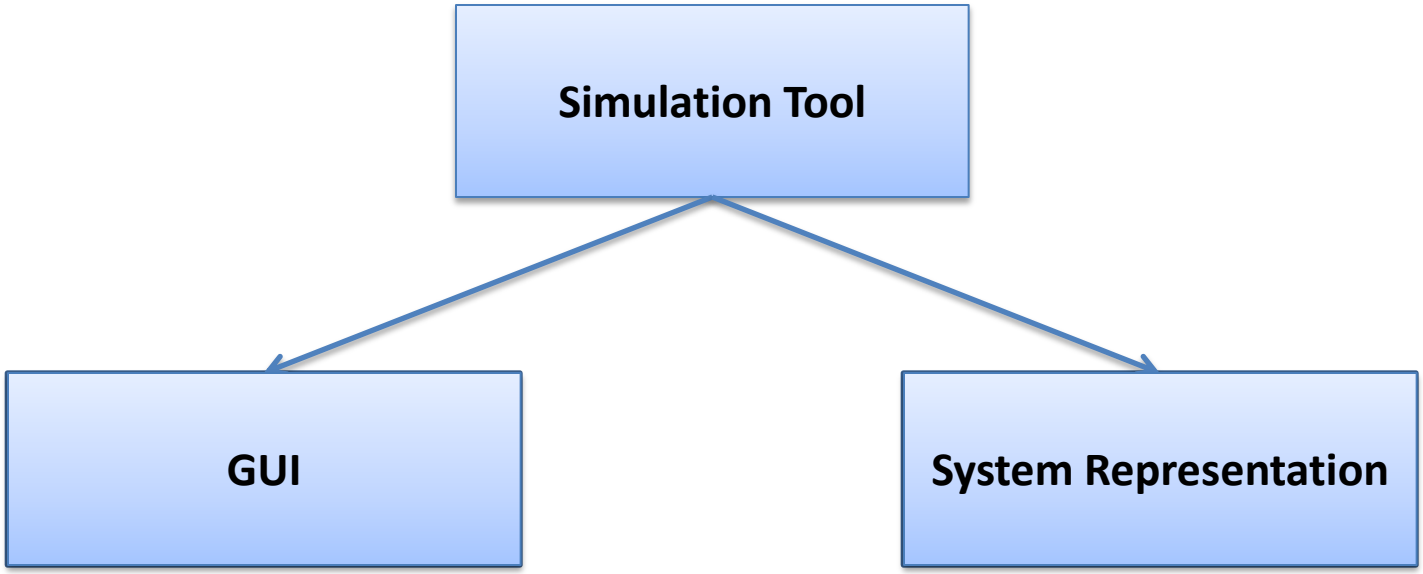
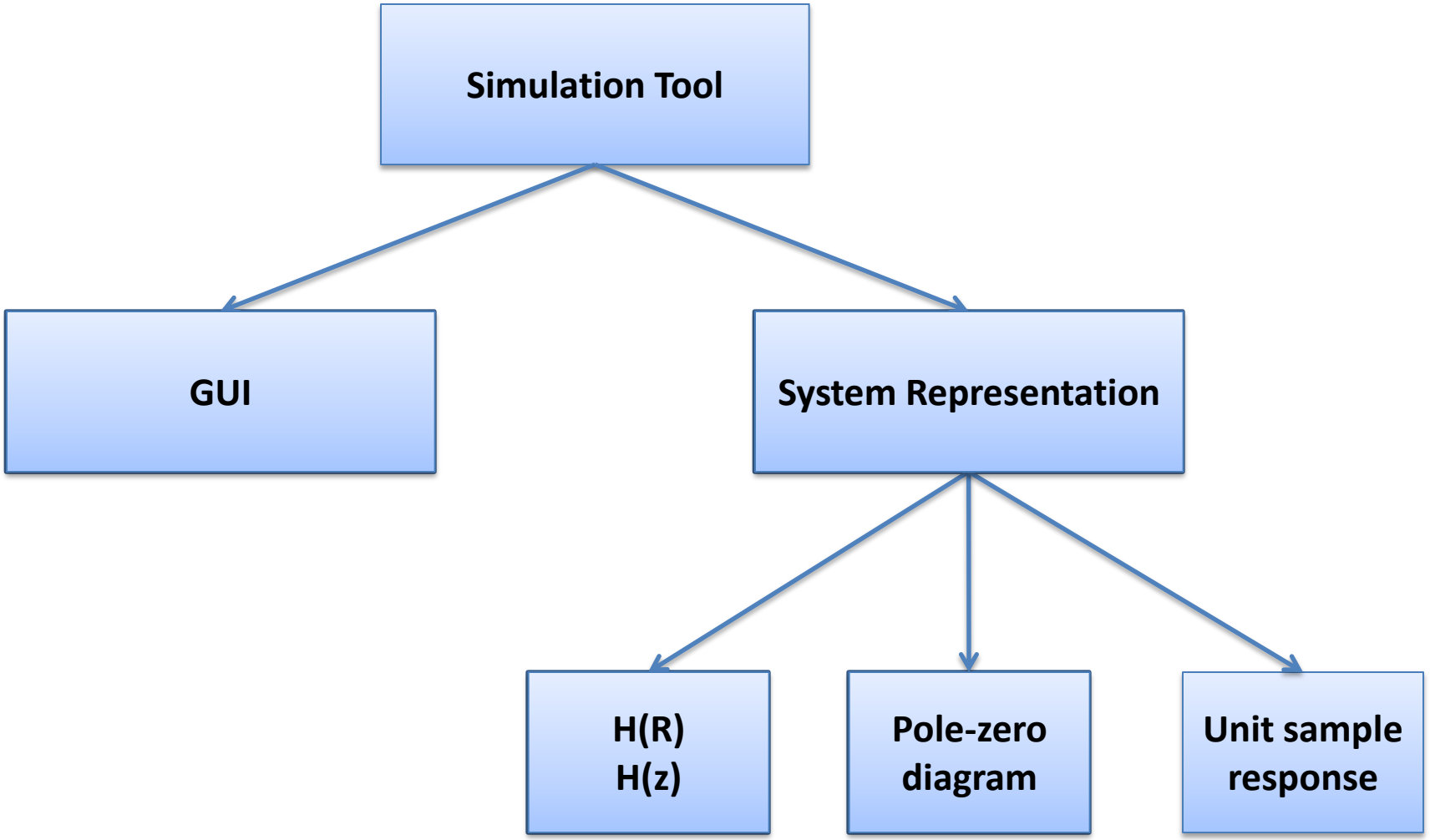


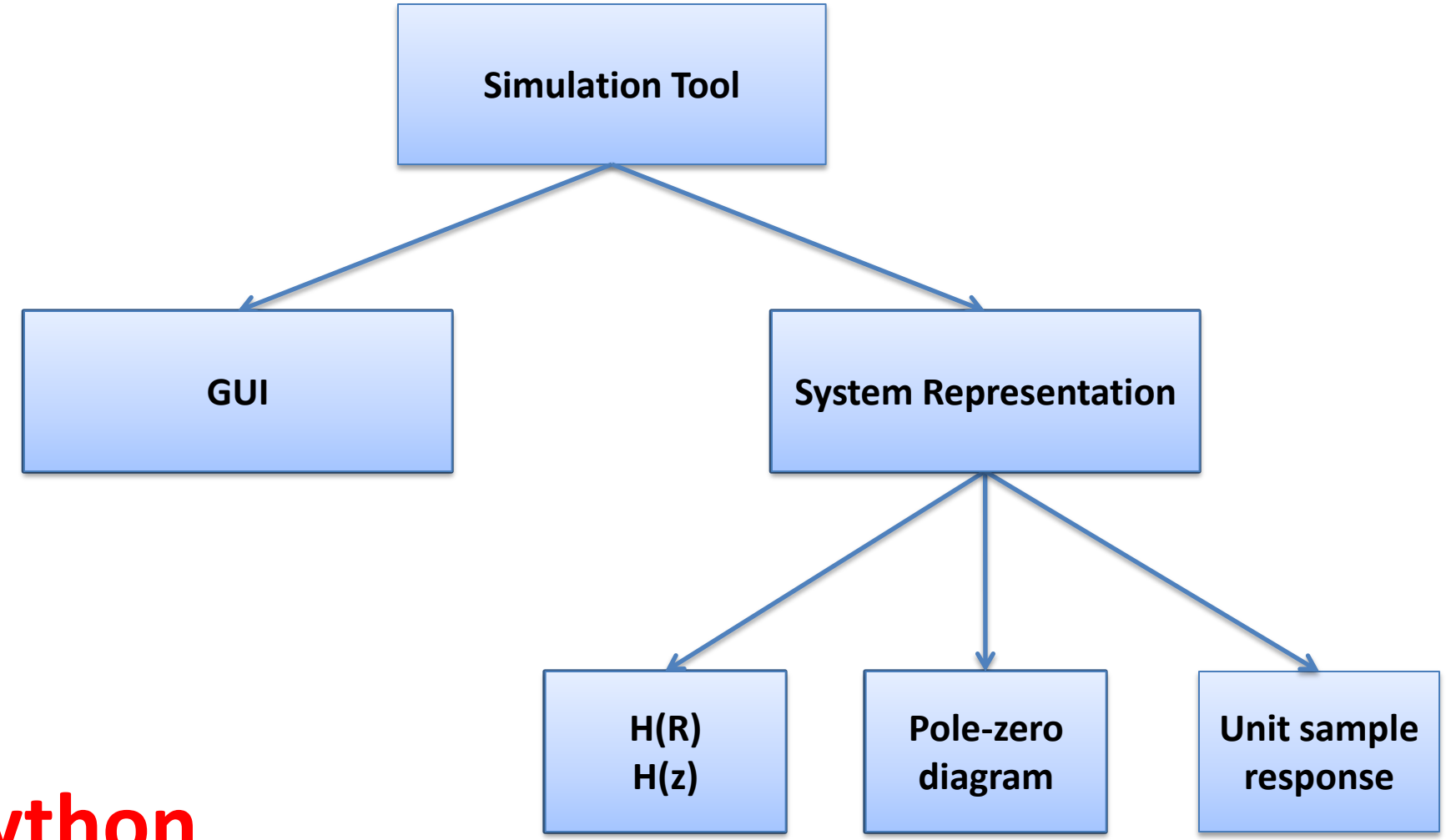
Implementation



Implementation



Implementation



Python

Implementation

- UAP
  - Start: IAP
  - End: March 30, 2013
  - Buffer: April

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  - **2 weeks**: H(R), H(z)
  - **1 week**: Pole-zero diagram
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- Regular progress meetings with Professor Freeman.

Computationally solving a system

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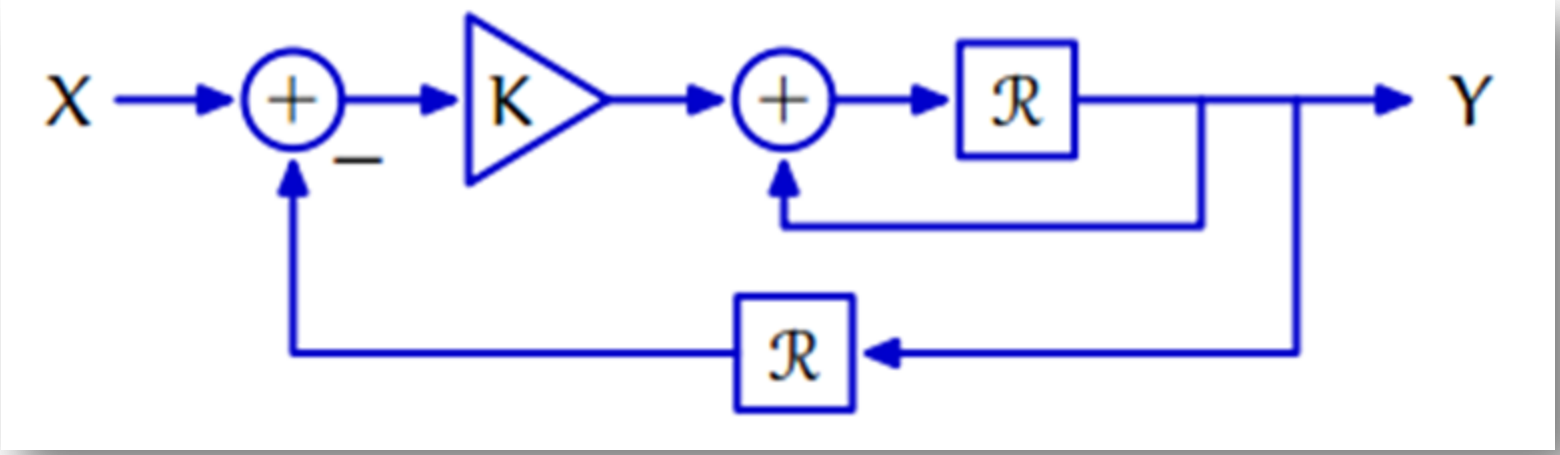
How do we solve systems?



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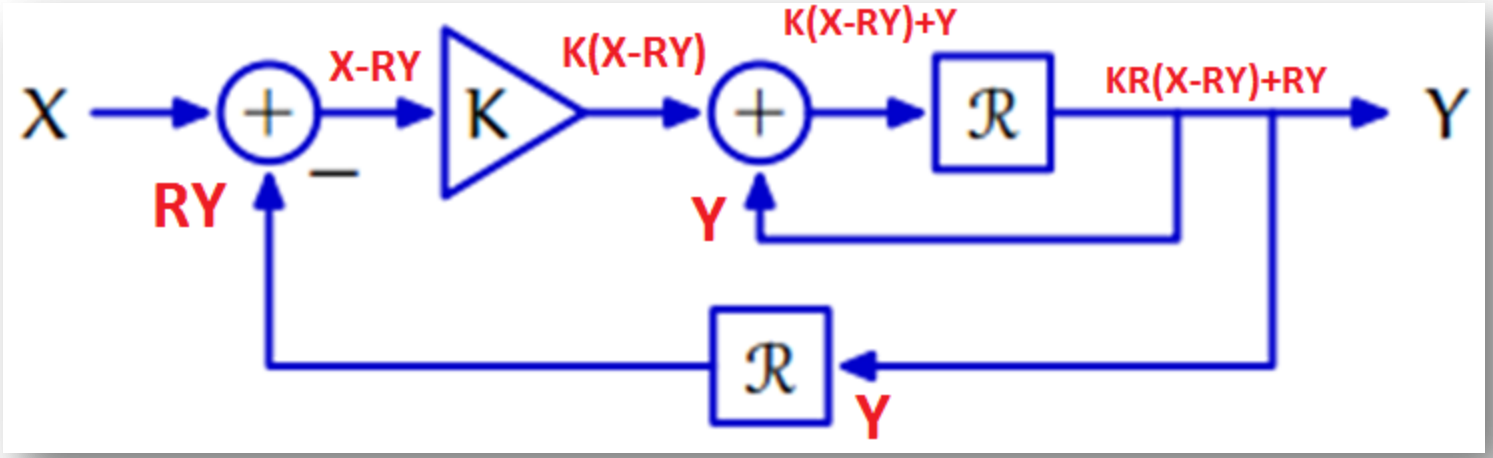

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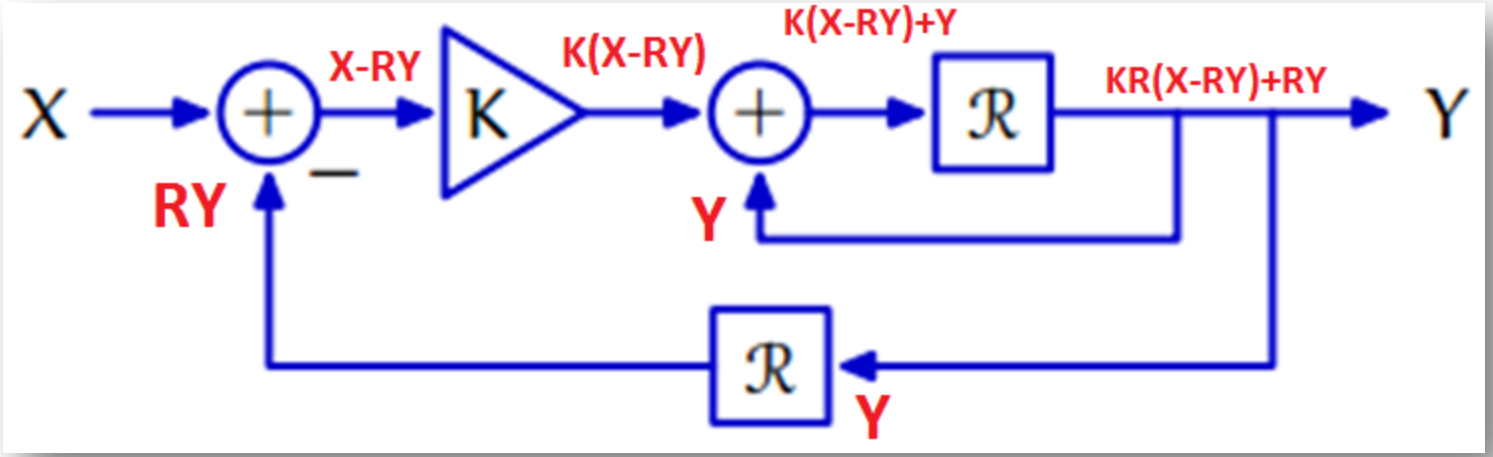


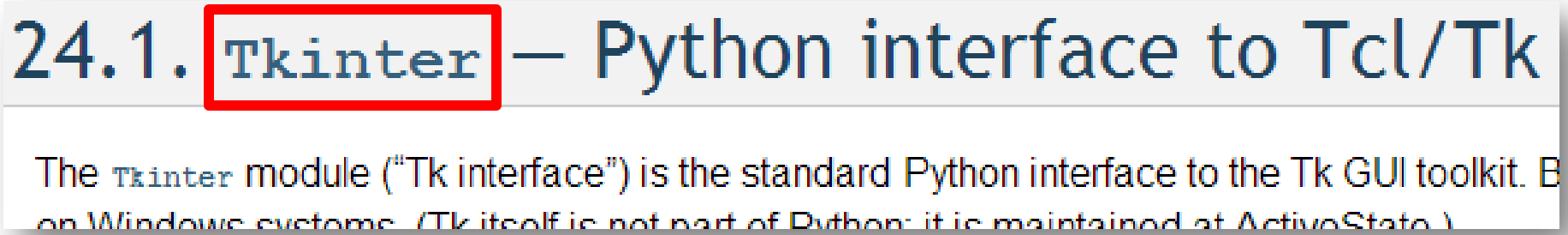
$$Y = KR(X - RY) + RY$$

$$H(R) = \frac{Y}{X} = \frac{KR}{1 - R + KR^2}$$

Risks

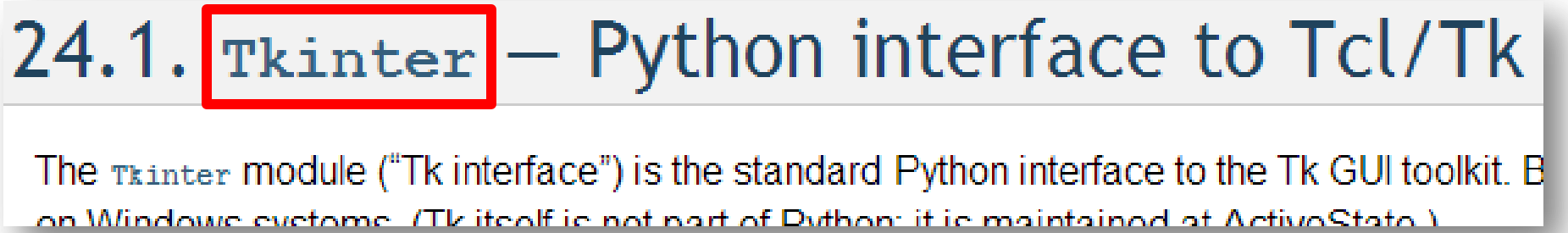
Risks

GUI Programming In Python



Risks

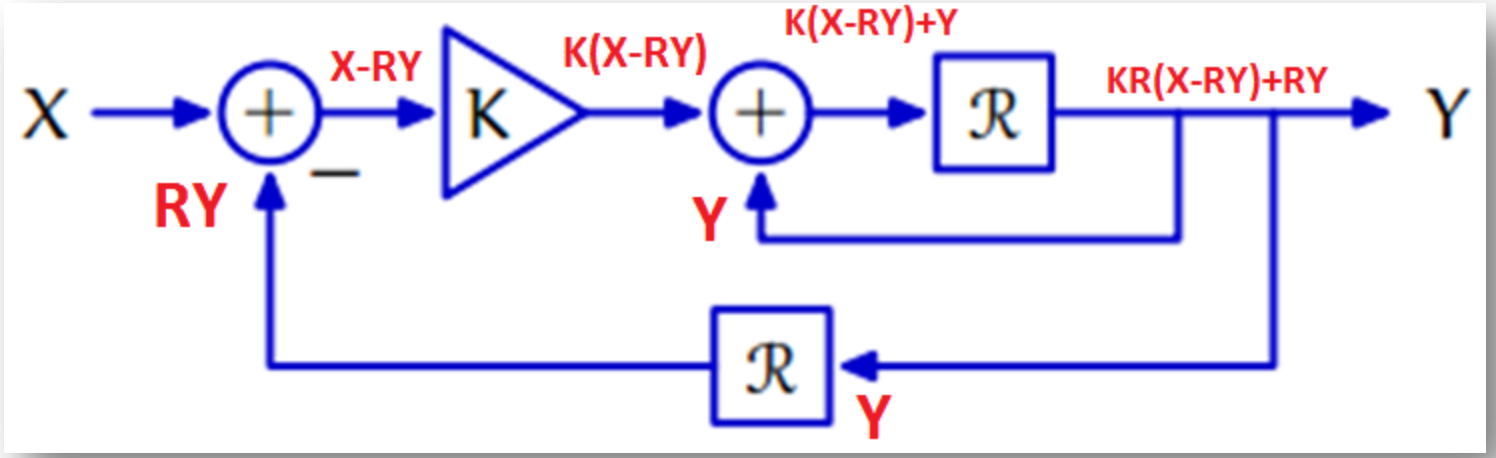
GUI Programming In Python



- Drag and drop?
- Support for various shapes + interconnections?
- Easy to integrate plots?
- Etc.

Risks

Technical difficulty of solving systems



Risks

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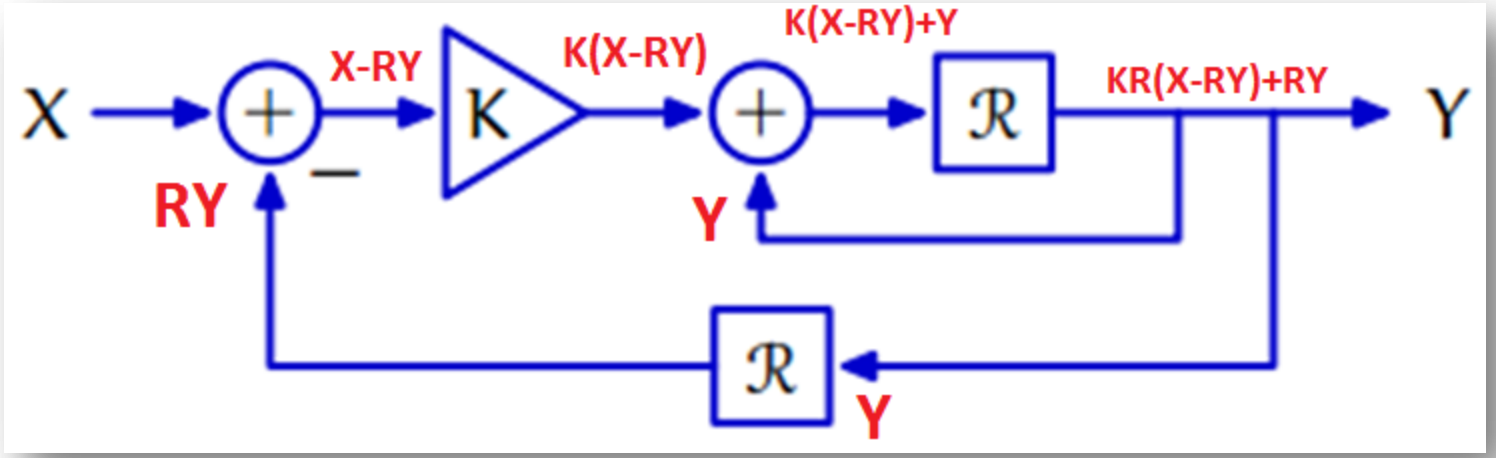

- How to detect errors in input
- Existing packages vs. what I'll have to implement
  - Polynomial representation
  - Equation solver
- Etc.

Risks

Back-up plans

- Online documentations.
- If GUI Implementation becomes too difficult, settle for textual input.
- Build my own polynomial representation.
- Build my own equation solver.
- Last resort: meet with Professor Freeman when really stuck.

Why me?

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- Took **6.003** and **6.011**.

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- LA for **6.01** twice.

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Why me?

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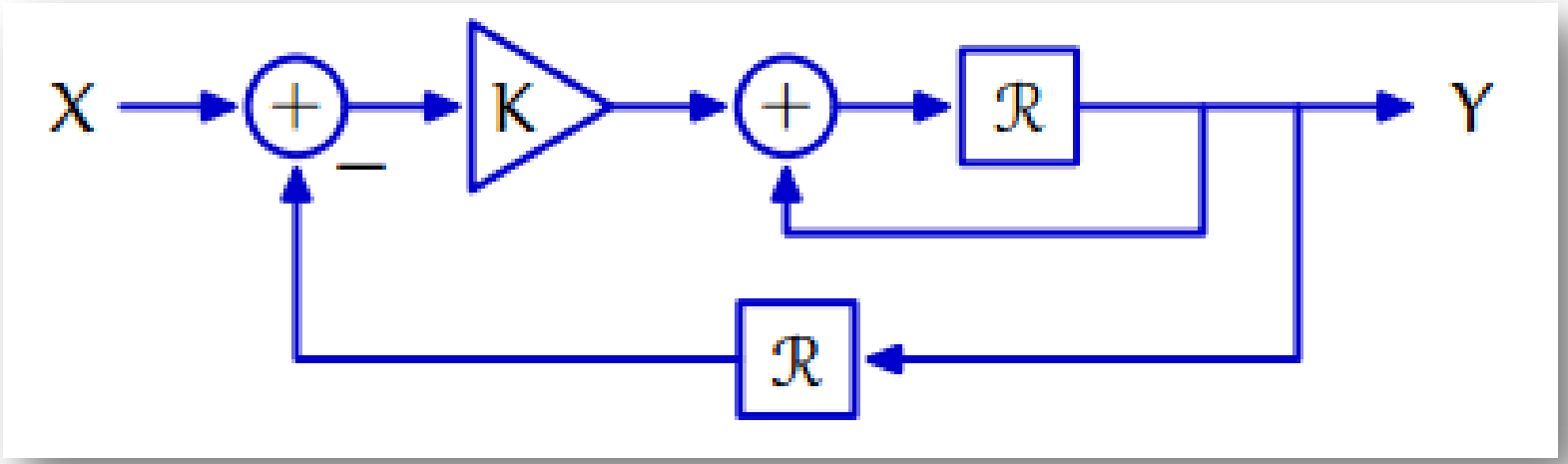
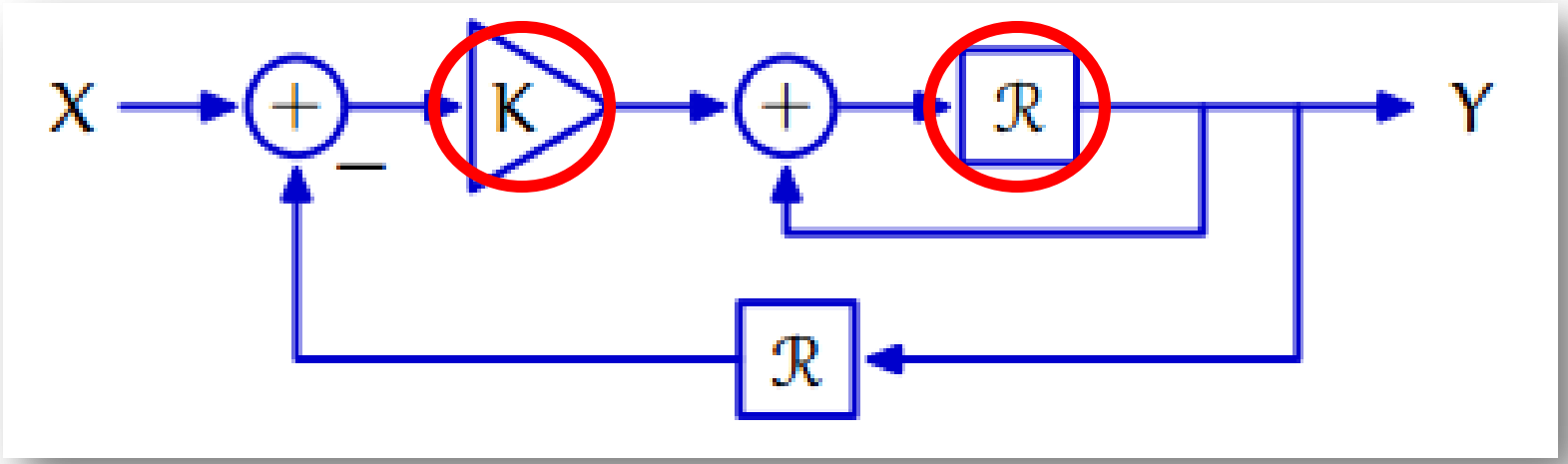
- Very interested in the material.

Ultimate goal



$$H(R) = \frac{KR}{1 - R + KR^2}$$

Ultimate goal



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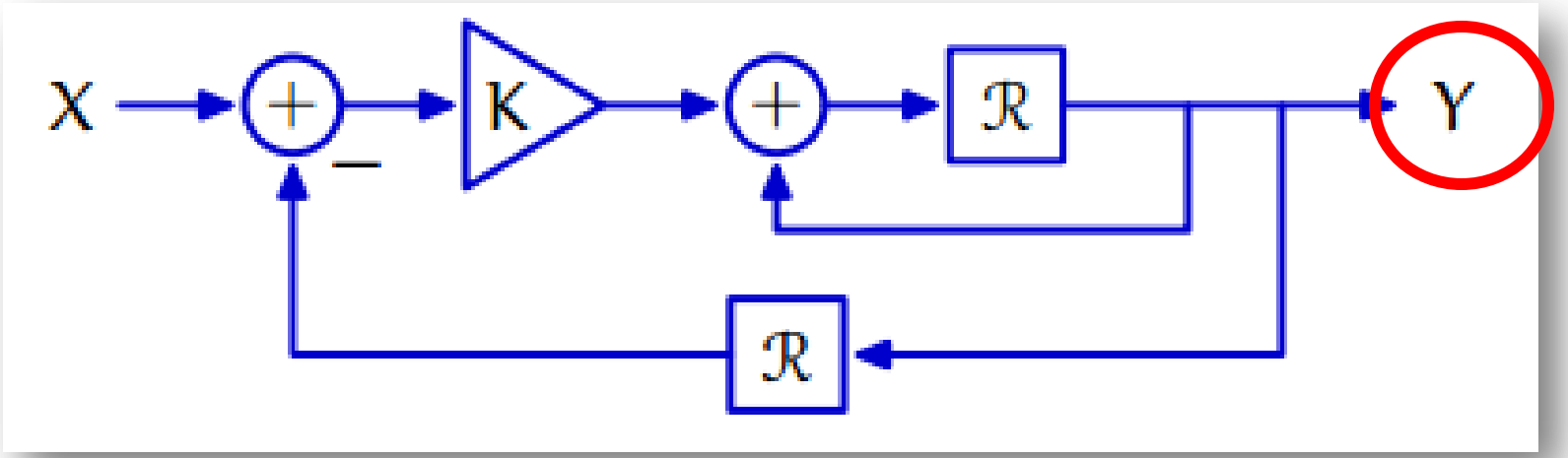

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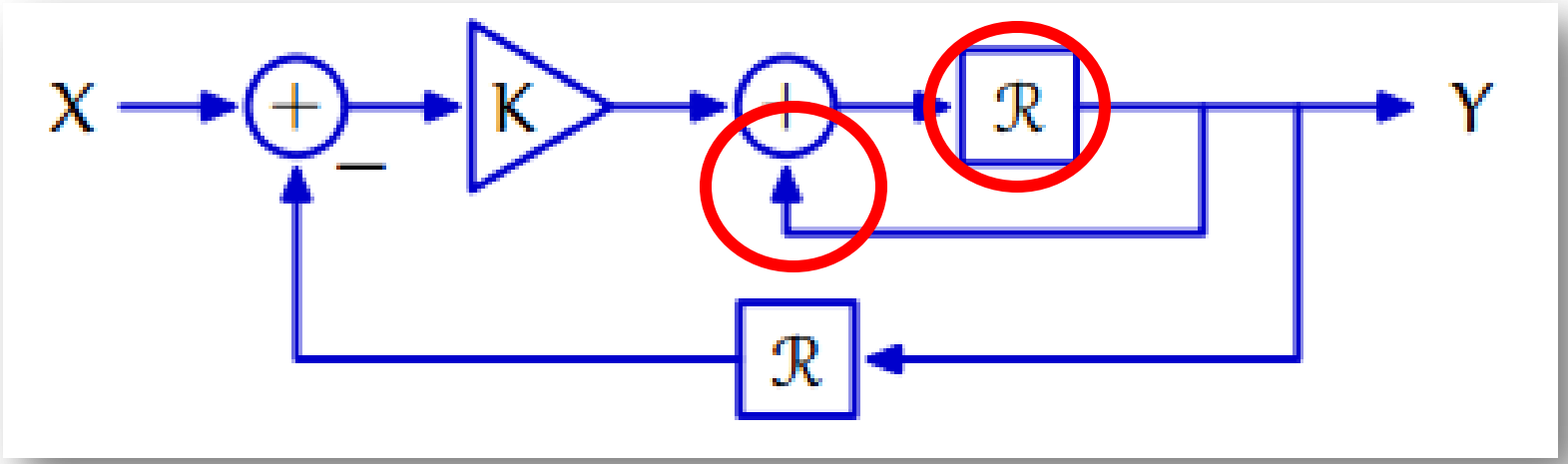

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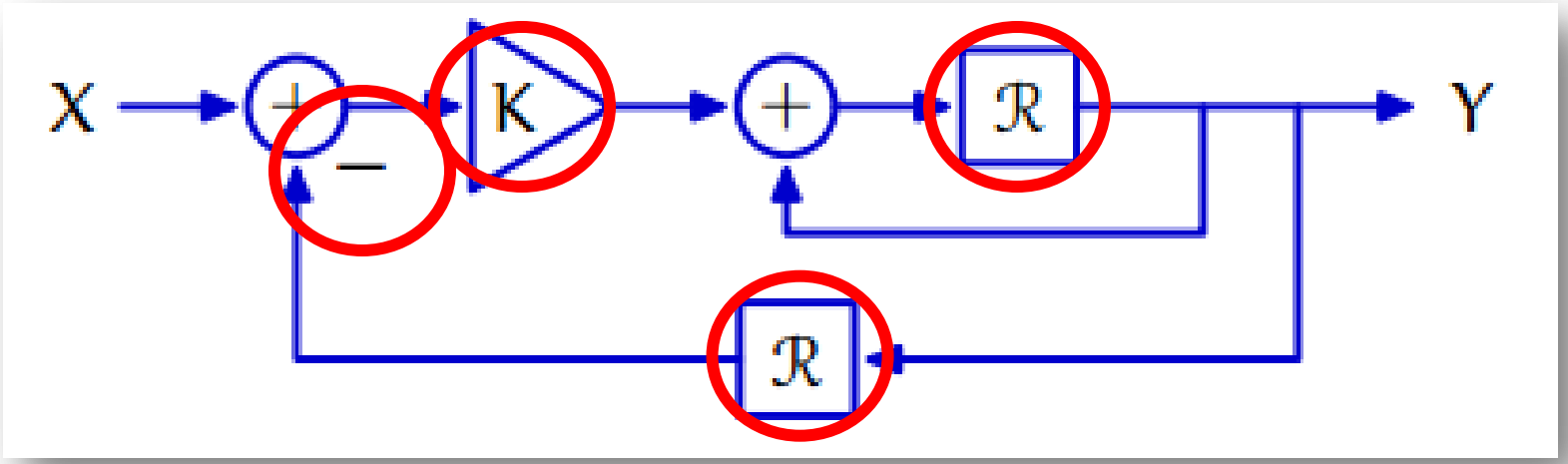

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