Lecture 11 - Midterm 2 Op-amps (?)

Some midterm stats:

Midterm Score Versus Homework

- Above 250 on HW (1, 2 & 3 totalled)
- Good HW score.
- You got above 80 on midterm, did really well!
Grade Distribution

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<thead>
<tr>
<th>Grade</th>
<th>Number of Students</th>
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<tr>
<td>A</td>
<td>33</td>
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<td>B</td>
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<td>11</td>
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(1) Midterm → Get it back today, ≈ 1:45ish

(2) O p-a-m-p-i → we will start after break.

(1.5) Synthesis change → I will post it later today

Distribution → I will post solution
Syllabus change:

This week:
- Op amps + lab lecture
  - No lab (no TA in lab)
  - HW for Monday; check online
    (on chapters 1 thru 5 concepts)

Next week:
- More on op-amps + diodes, masters
- Lab; check online (do able combo)
  (of labs 4, 5 & project info)

CANCELLED digital logic we have an extra week
Op-amp — operational amplifier

Chapter 14 - 14.1 - 14.4 (inclusive)

In reality:

Circuit symbols:

U \( P \) → + → Udd

U \( \text{Vin} \) → - → U \( \text{Out} \)

Talk to me about it in office hours.
Circuit model description

Note:

1) 5 terminal device

2) Unfortunately, op-amp is a nonlinear device.

Effect of power supply.
First, we will talk about nonlinear systems and why they are so cool. (Dynamic systems, i.e., we have a differential equation)

1. Multiple equilibrium points

2. Bifurcations

(2) Example next time

Set more equilibrium points if you vary system parameters.

\[
\begin{align*}
\ddot{x}_1 &= (1+\varepsilon) x_1^2 \\
\ddot{x}_2 &= \varepsilon \sin(x_2)
\end{align*}
\]