345 - LECTURE 4 - PARTIAL FRACTION EXPANSION - PART 2

BIG Picture Review:

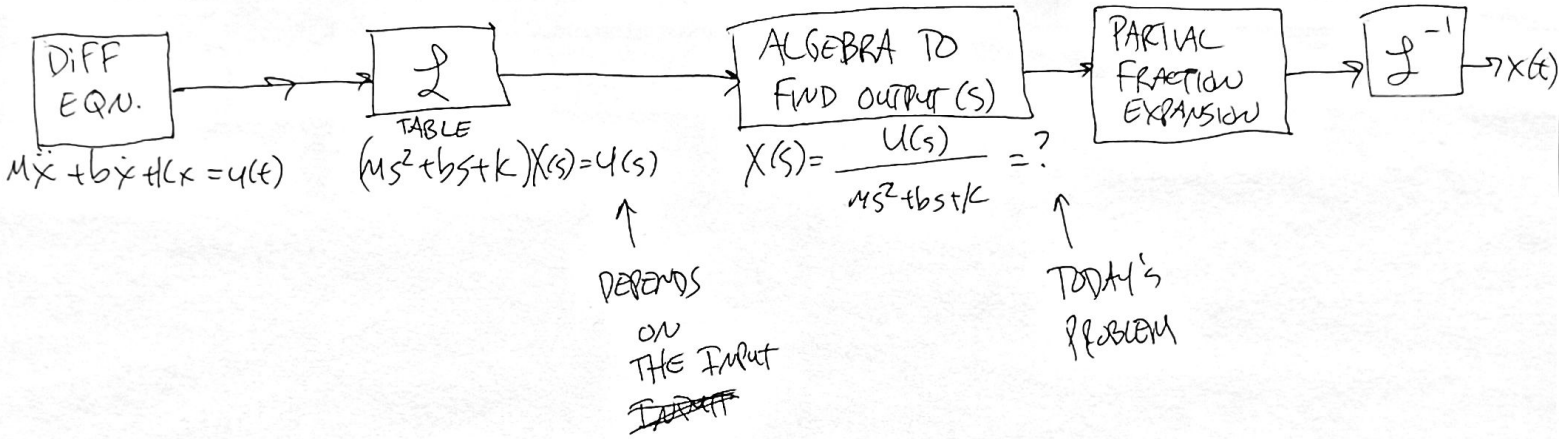
- dynamic systems are modeled using diff. eqns.
- diff. eqns. are hard and messy and time consuming
- Laplace turns diff. eqns. into algebra
  - when I first learned this as a senior at MTU, I was baffled that we didn't learn this sooner
- we are going to use the table for both forward and inverse Laplace
  - I have done a few derivations
    - I will not ask you to do any
  - I want you to know where the table comes from and that it isn't magical

ONE MORE NOTE ON WHY MY TABLE IS SO SHORT *

- partial fraction expansion is the key to using the table for inverse Laplace

FOOT NOTES

* Dynamic systems and control is what I do.
  Laplace is how I think about systems.
  But I don't carry a table in my pocket.
  I don't know any controls experts
  who carry around Laplace tables.
  → the one page table contains the
  essentials
  - you can probably solve 95% of
  d.s. + cntrl problems with it
  → it contains what I have unintentionally
  committed to memory over the years



EGR 345 - LECT 4 - PARTIAL FRACTION EXPANSION - PART 2

- Partial Fraction Expansion is all that stands between us and being fully able to solve diff. eqns. via Laplace
- We said there are 3 steps to partial fraction expansion and 3 cases we need to learn how to handle
  - we have already learned 2 cases

- 3 steps:
  1. recognize roots/poles ← of the denominator
  2. solve for unknown coeff. (mostly in numerator)
  3. look up individual terms in the table

- 3 cases:
  1. distinct real roots
  2. repeated roots
  3. complex conjugate pairs of roots