474 Instructor Notes from Day 14 slides:

Slide 3: How many languages are there?

IThe answer is no, so L_d is not in the enumeration, and the set of languages is uncountable.

Write "Floyd-Warshall" on the board.

Slide 4: **How Many Regular Languages?**

How do we know that there are countably many regular expressions over a given alphabet?
We can easily enumerate them, based on the number of rules involved in the construction.

Slide 8: **Regular Does Not Always Mean Tractable**

How many states are there? Each disk is on one of the three poles. The order of the disks on a given pole is fixed. So there are 3^{64} states.

Slide 10: **Closure Properties of Regular Languages**

Reverse:
By construction. Let $M = (K, \Sigma, \delta, s, A)$ be any FSM that accepts *L*. *M* must be written out completely, without an implied dead state. Then construct $M' = (K', \Sigma', \delta', s', A')$ to accept *reverse*(*L*) from *M*:

Initially, let *M′* be *M*.
Reverse the direction of every transition in *M′*.
Construct a new state *q*. Make it the start state of *M′*. Create an ε-transition from *q* to every state that was an accepting state in *M*.
M′ has a single accepting state, the start state of *M*.

Slide 11: Closure of Regular Languages under intersection

$L(M1) \cap L(M2) = \neg(\neg L(M1) \cup \neg L(M2))$.
In the homework, you will directly construct a machine to do the intersection

Slide 12: **Closure of Regular Languages Under Difference**

$L(M1) - L(M2) = L(M1) \cap \neg L(M2)$.

Slide 16: **Don't try to use closure backwards**

Also intersection of $\{a^n b^n\}$ and $\{a^n b^{n+1}\}$ is empty, hence regular.