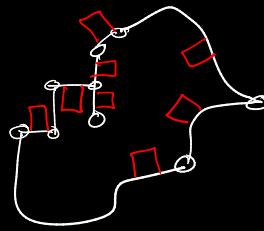
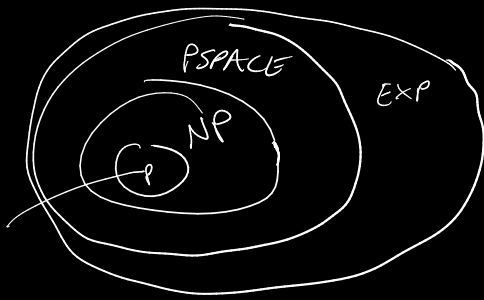


Problems we can realistically solve



NP-Complete
 • NP-hard
 • member of NP

$\neg x_1$

3SAT - Satisfiability

3 variables in each clause

$$\phi = (x_1 \vee \bar{x}_2 \vee x_3) \wedge (x_2 \vee \bar{x}_3 \vee \bar{x}_1) \wedge \dots$$

Boolean equation

- M clauses
- 3 variables w/ "OR"s
- have "AND"s between them

• Is there an assignment to the n variables that make $\phi = T$ (satisfiable)

$x_1 = F$
 $x_2 = F$
 $x_3 = F$
 \vdots
 \vdots

Thm. 3SAT is NP-complete.

Thm. Edge labeling is NP-hard

take any 3SAT instance and turn it into an Edge labeling puzzle.

Planar 3-SAT

