

How we use reduction to show a problem is (polynomially)

EASY:

Recall we can determine shortest paths in G in poly time.

Dist

	0	1	2	3	4
0	0	140	3	∞	∞
1		0			
2			0		
3				0	10
4				10	0

Alg S

Then we can compute Connectivity of G as follows:

Connected = " on input $\langle G \rangle$ where G is a graph :

1. Run SP on G .

2. $\forall i = 0 \dots 4$

$\forall j = 0 \dots 4$

if $\text{Dist}[i][j] == \infty$

REJECT

3. ACCEPT "

To prove X is easy:

$X =$
 - do polynomial amount of work
 - call Y
 ← Known easy

∴ X is easy. X

To prove a problem X is "hard"

$\nearrow Y$ = polynomial amount
of work
call X

known
hard

∴ X is hard.