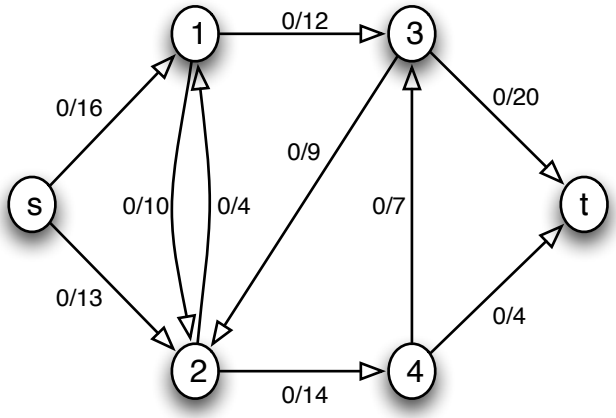
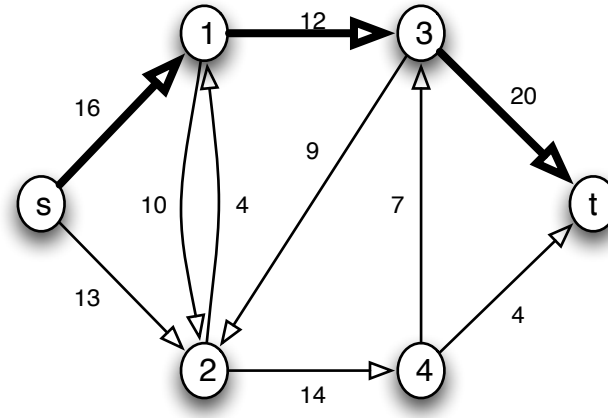
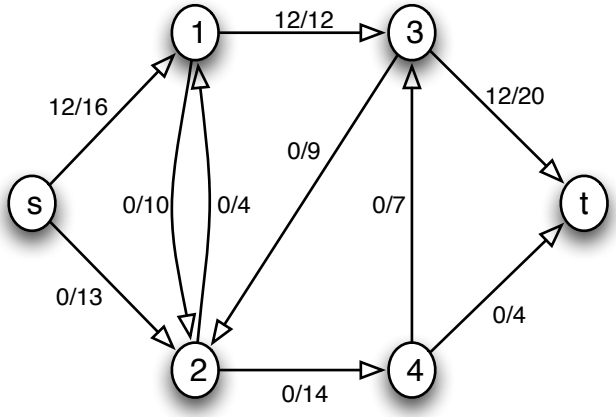
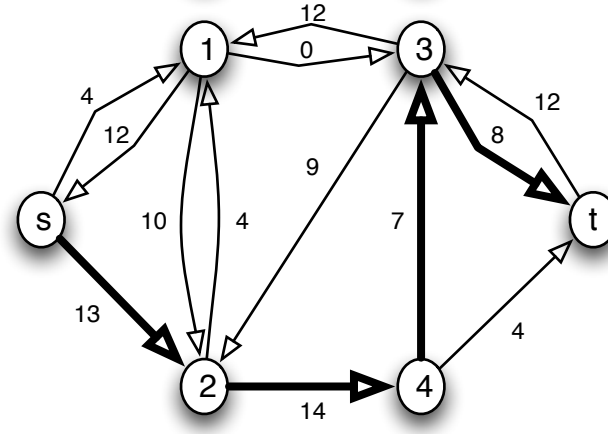
Flow network

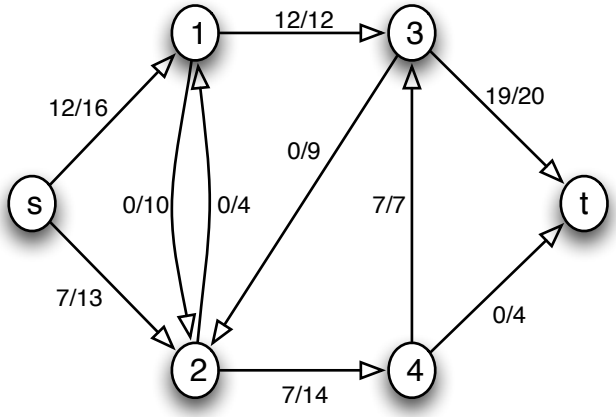


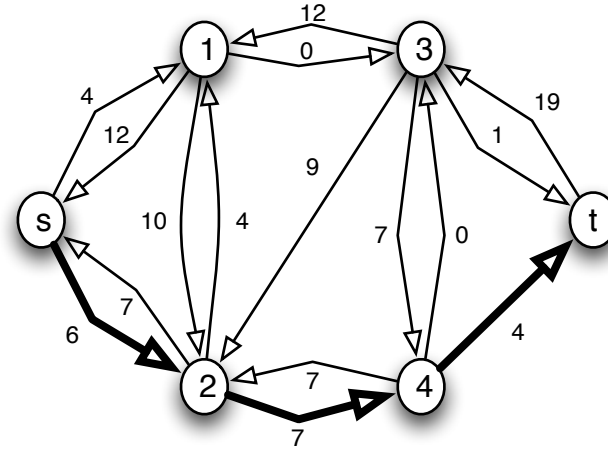
Residual network

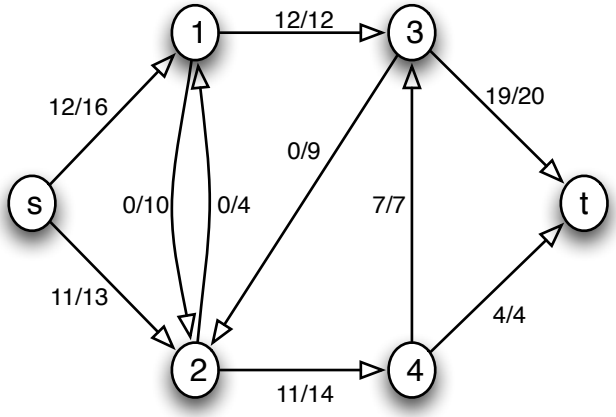


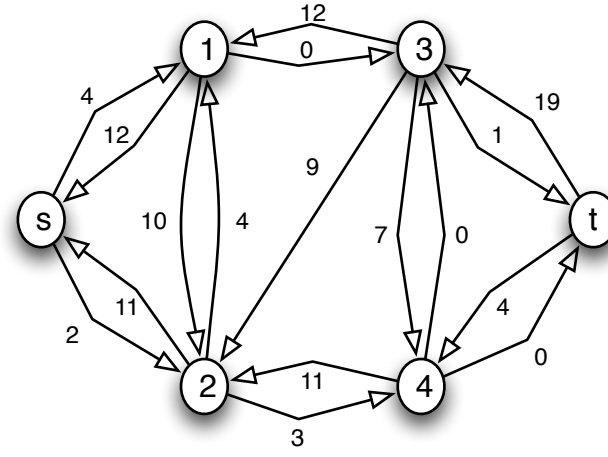


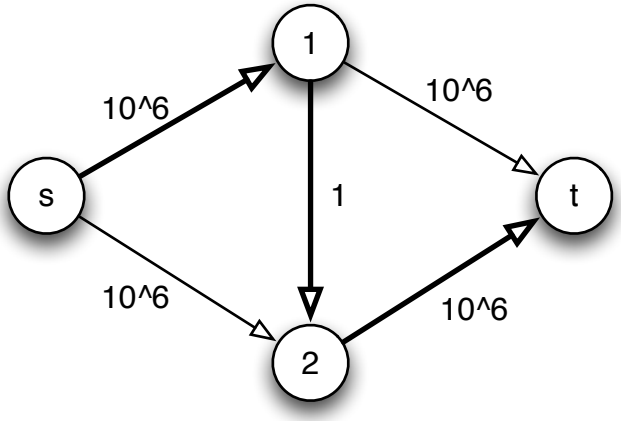


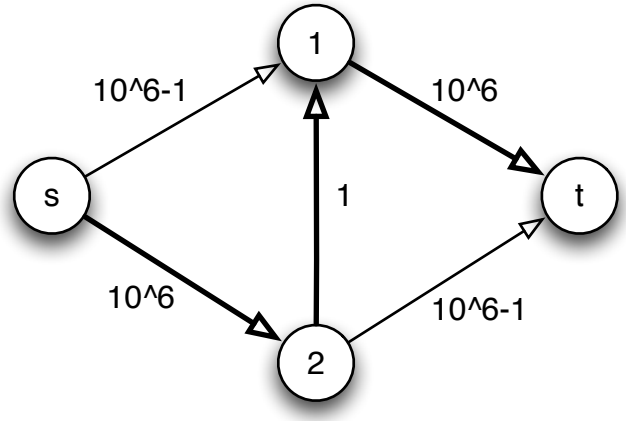


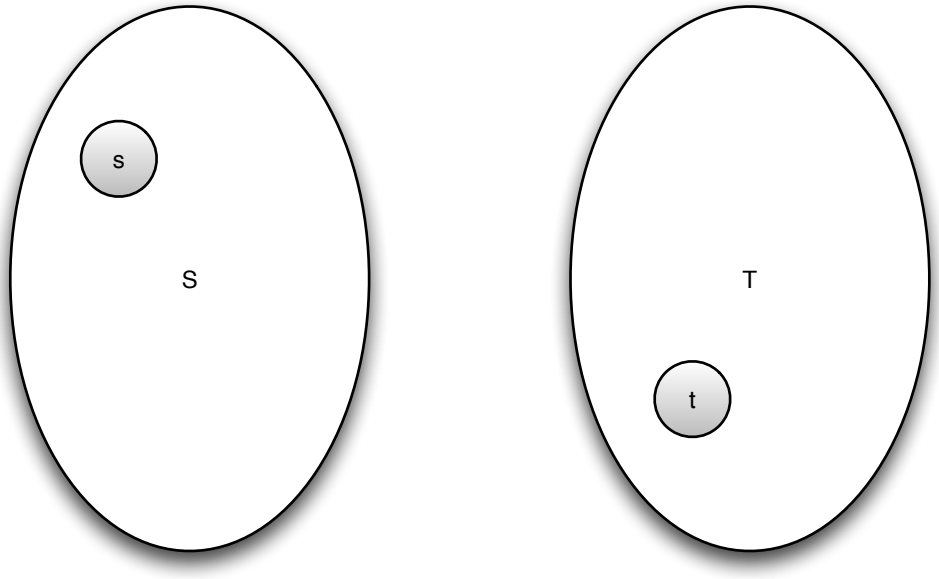


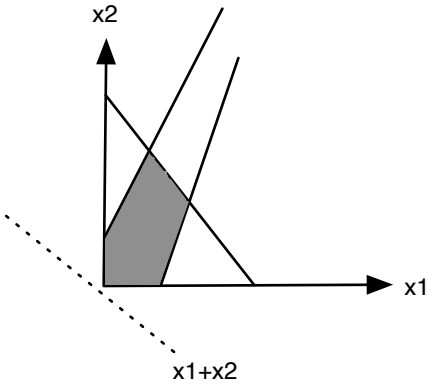


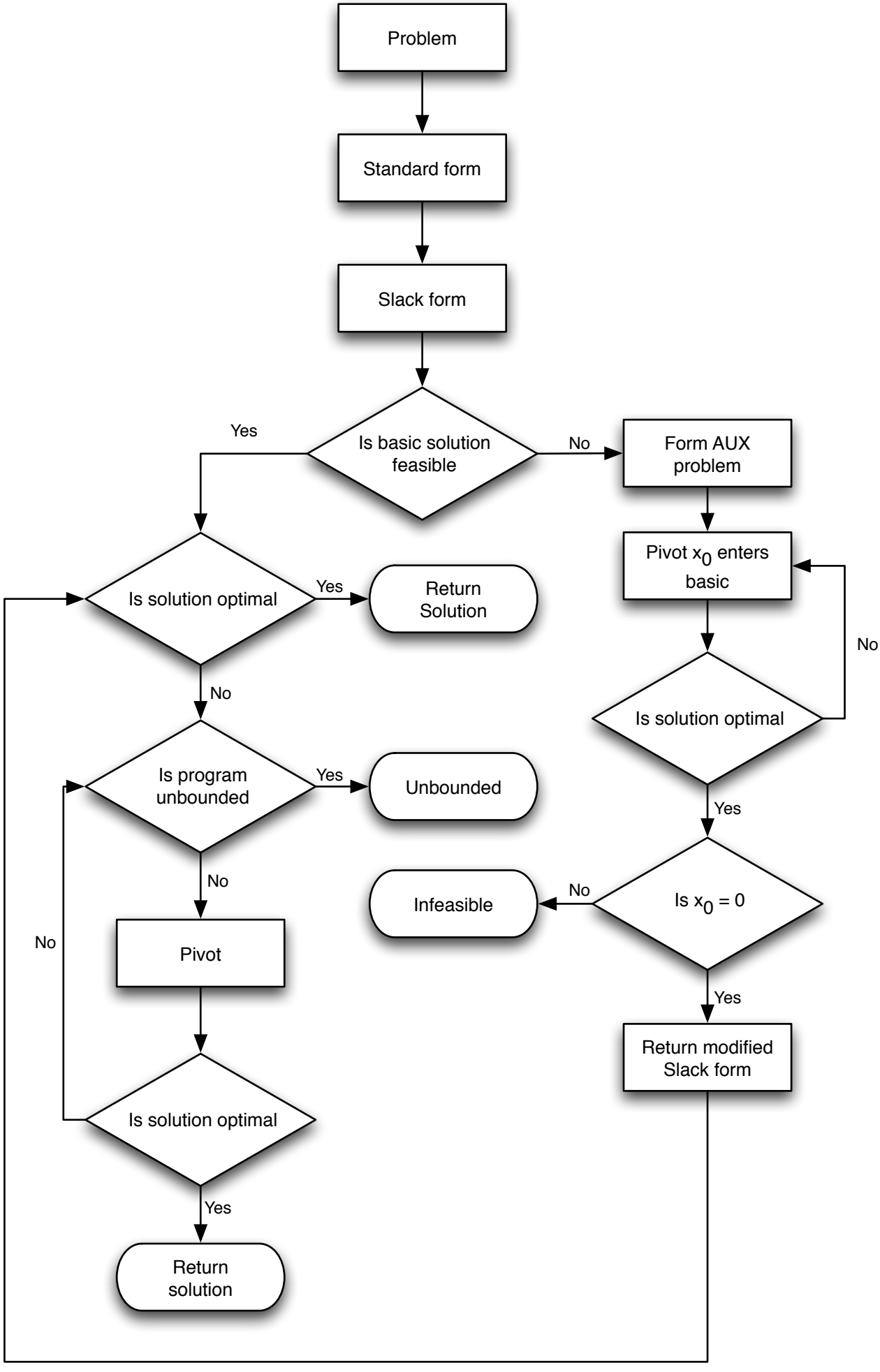


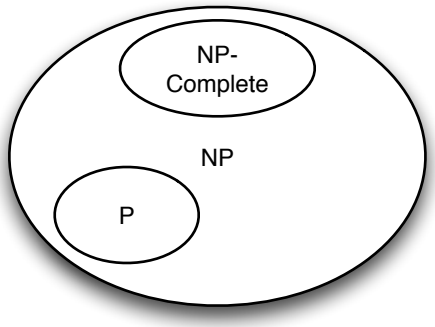

1
10^6
10^6
s
1
t
10^6
10^6
2

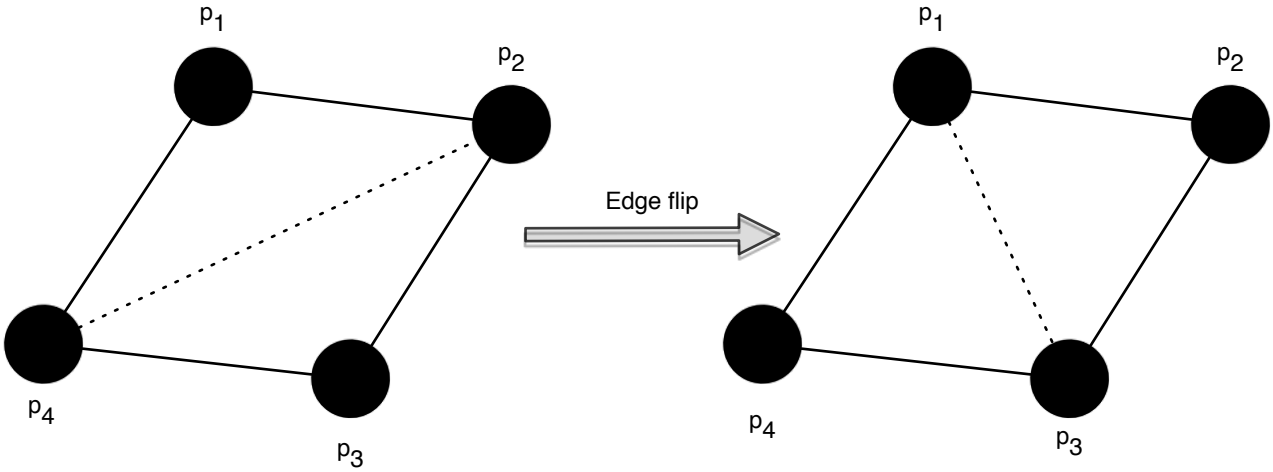

1
10^6-1
10^6
s
1
t
10^6
10^6-1
2

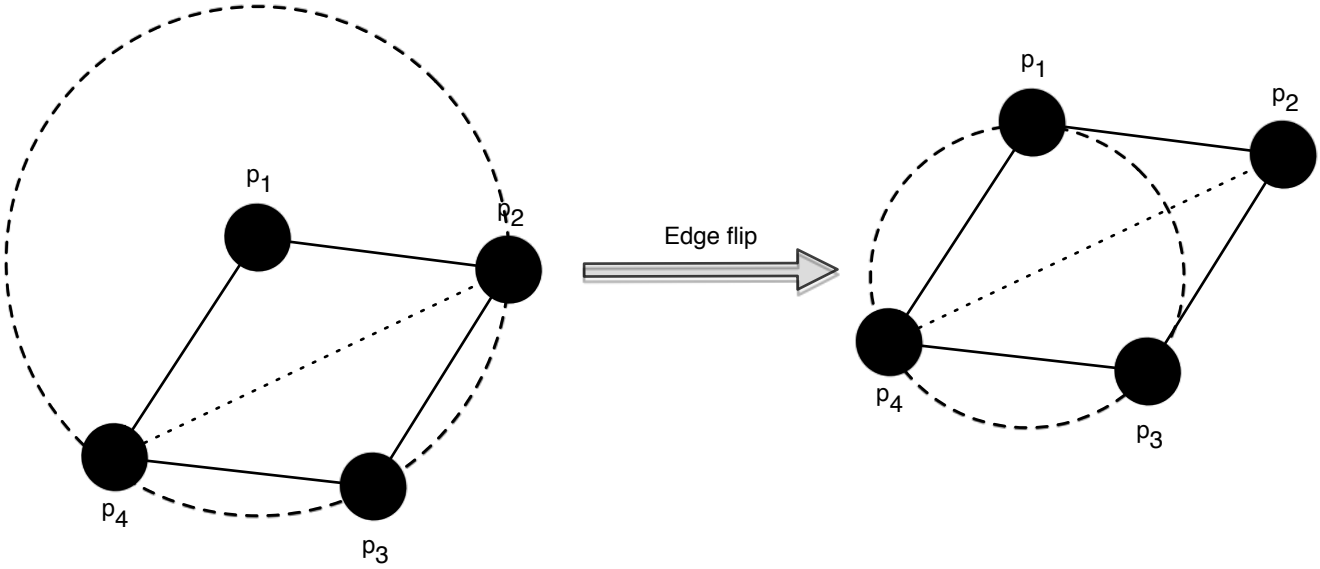

s
S
T
t

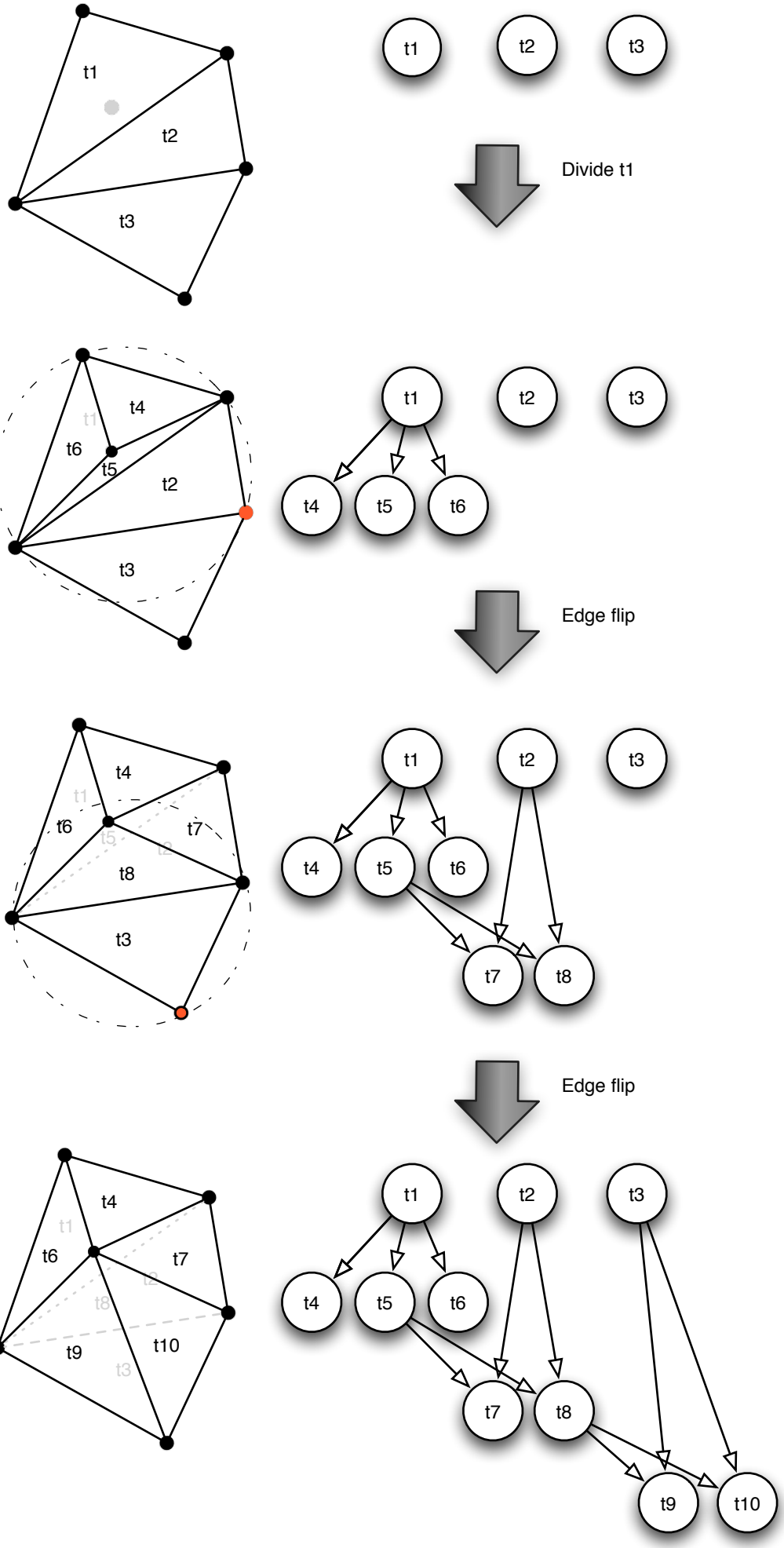

x2
x1
x1+x2

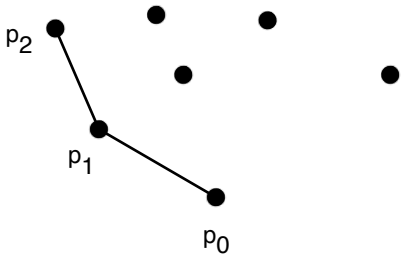

Problem
Standard form
Slack form
Is basic solution feasible
Yes
No
Form AUX problem
Pivot x_0 enters basic
Is solution optimal
No
Is solution optimal
Yes
Return Solution
No
Is program unbounded
Yes
Unbounded
No
Pivot
No
Is solution optimal
Yes
Return solution
Yes
Is $x_0 = 0$
No
Infeasible
Yes
Return modified Slack form


NP-
Complete
NP
P

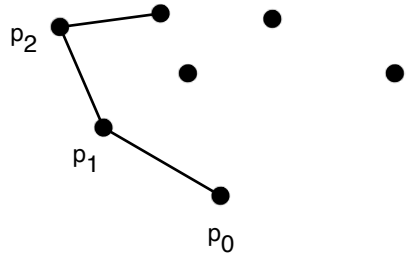

p1
p2
p4
p3
Edge flip
p1
p2
p4
p3


p1
p2
p4
p3
Edge flip
p1
p2
p4
p3

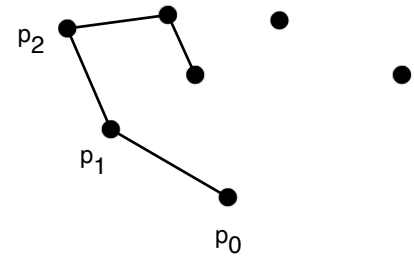

t1
t2
t3
Divide t1
t4
t5
t6
Edge flip
t7
t8
Edge flip
t9
t10



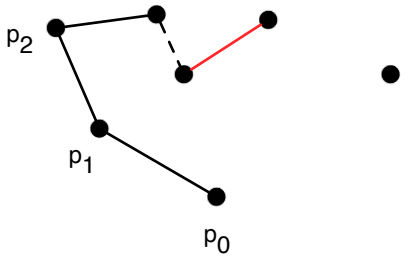
(A)



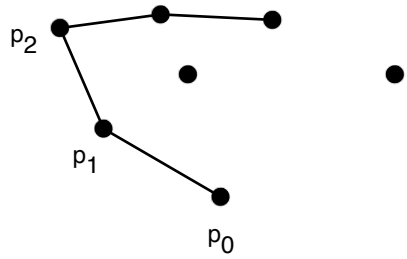
(B)



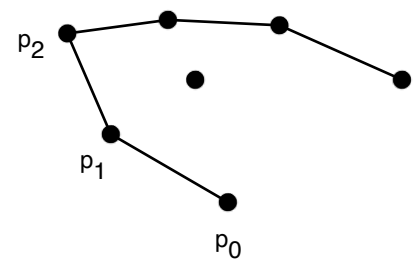
(C)



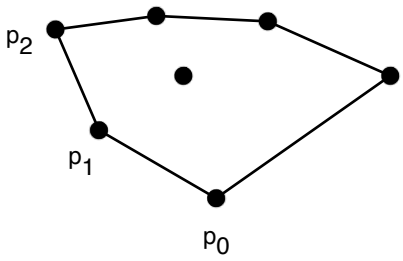
(D)



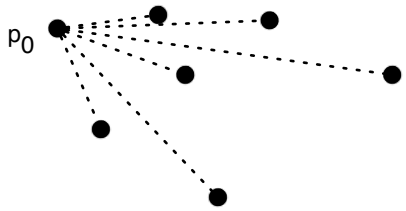
(E)



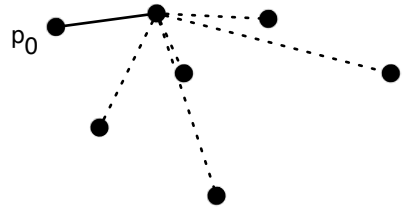
(F)



(G)



(A)



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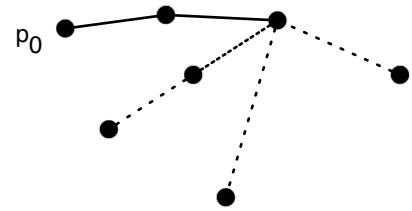

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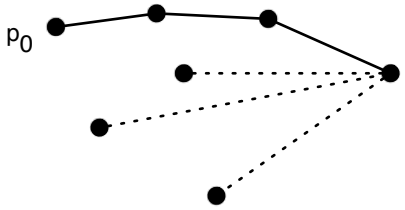

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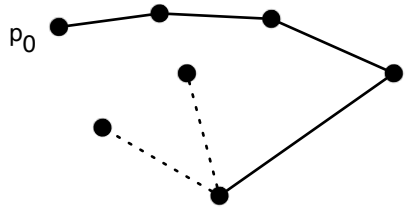

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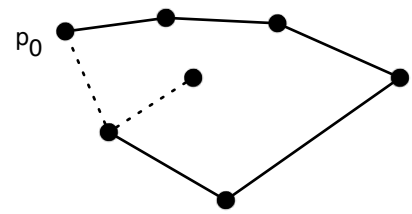

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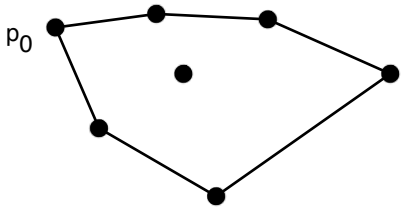

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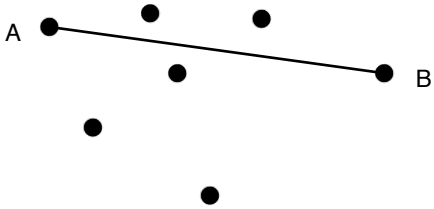
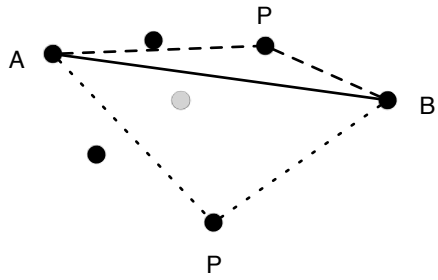


(A)



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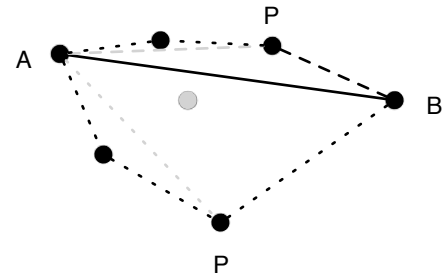

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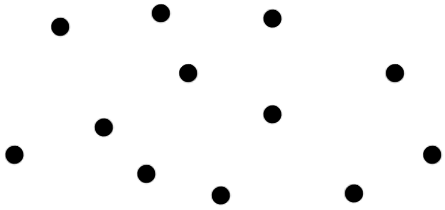
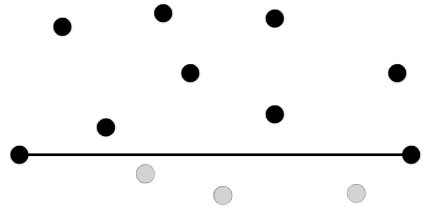


(A)



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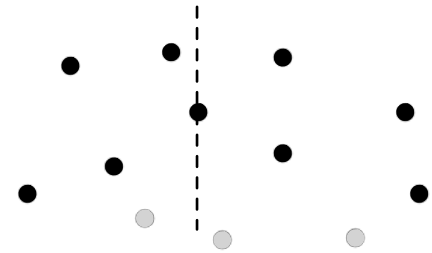

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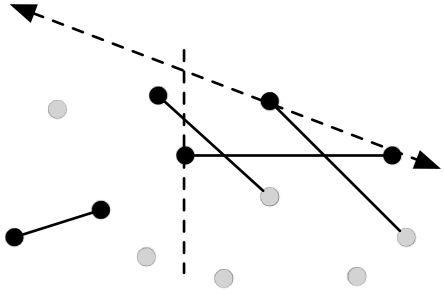

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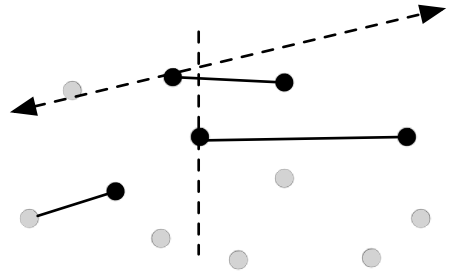

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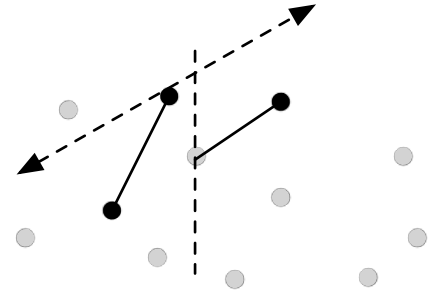

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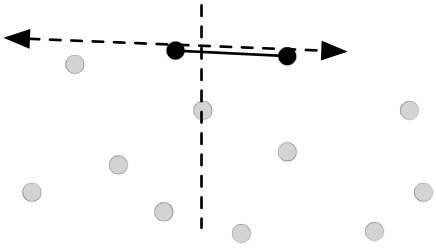
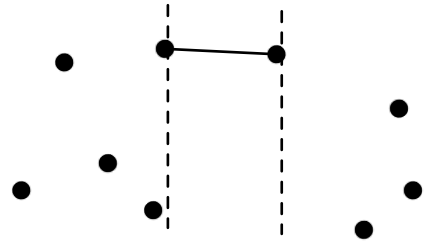
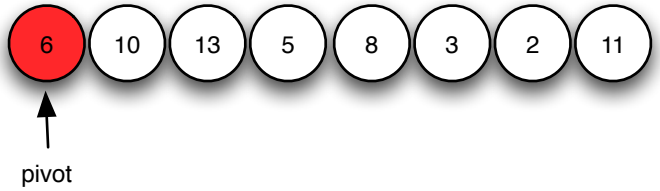


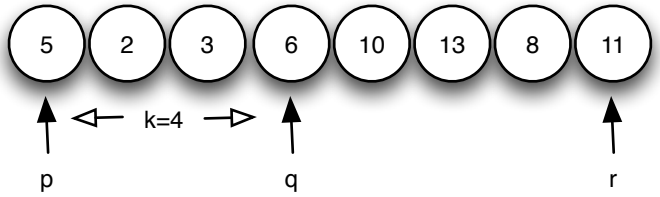
(G)



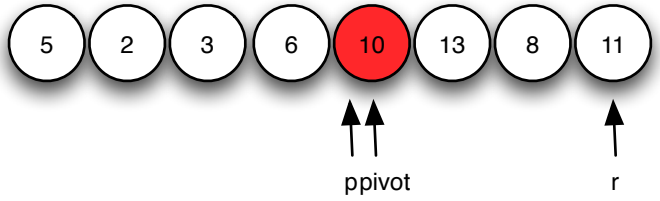
(H)

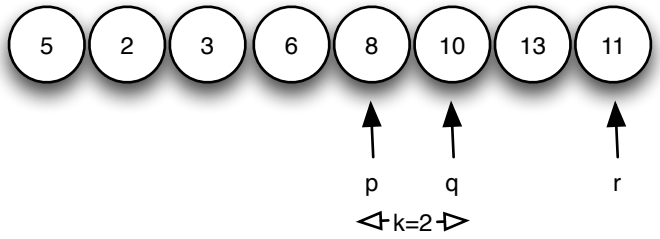
We are looking for the 7'th smallest element i.e i=7



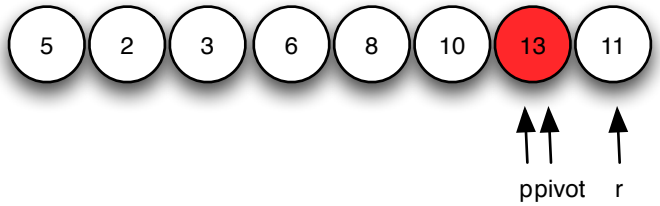


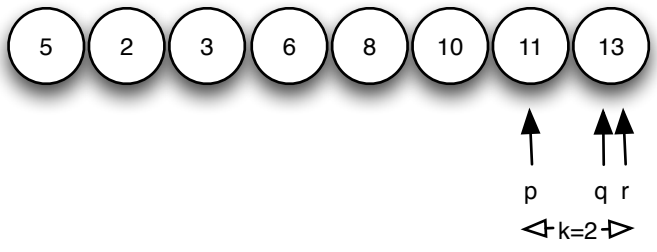
Since i>k we do a recursive call on the right side. i becomes i-k = 7-4 = 3



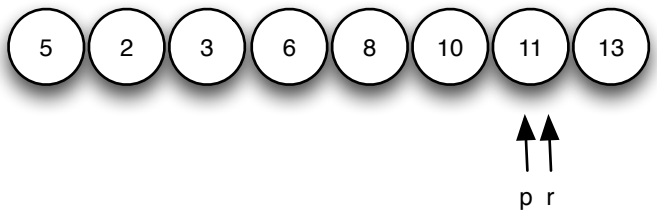


Since i>k we do a recursive call on the right side. i becomes i-k = 3-2 = 1



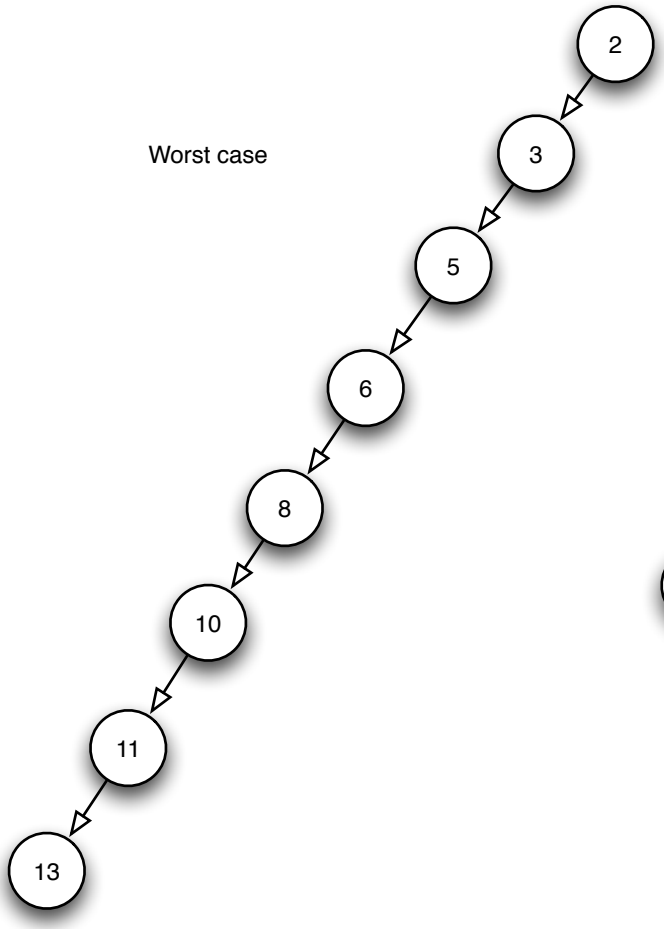


Since i<k we do a recursive call on the left side. i does not change

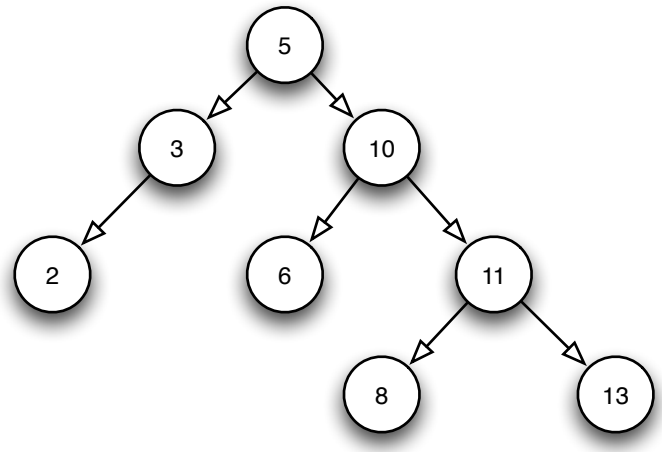


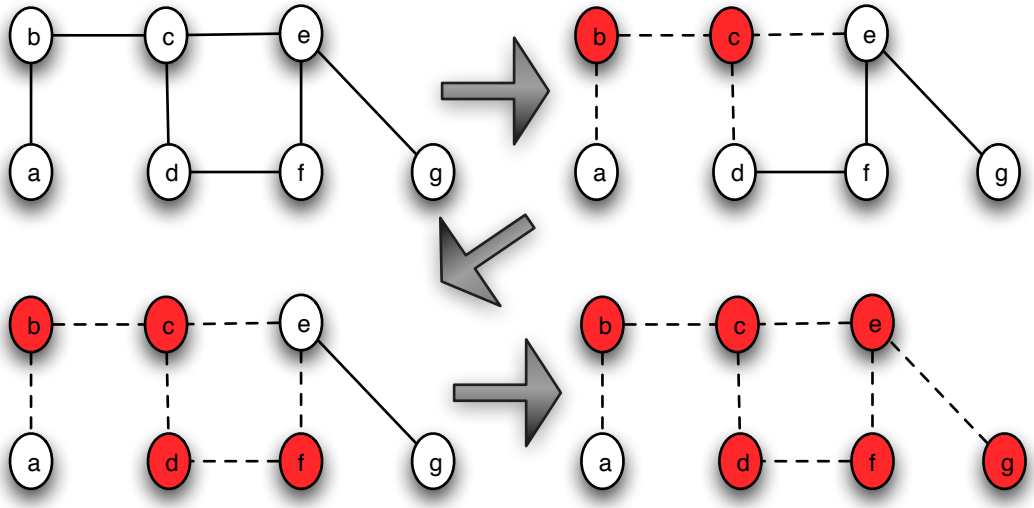
Since p==r the algorithm stops and returns 11

Worst case



Randomized




b
c
e
a
d
f
g
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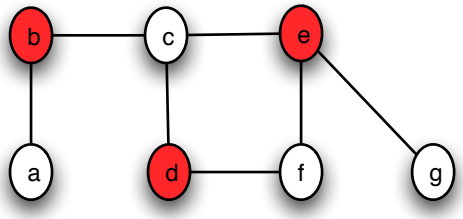
b
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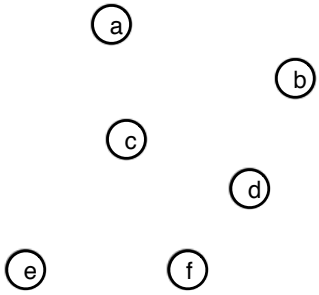
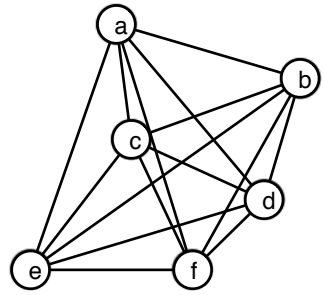
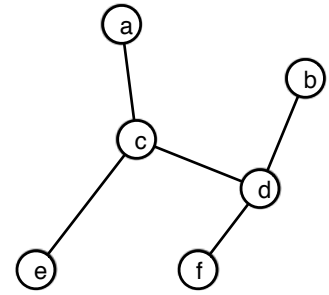
e
a
d
f
g



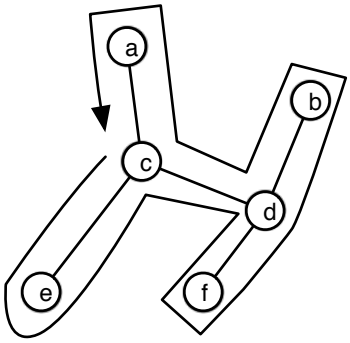
(A)



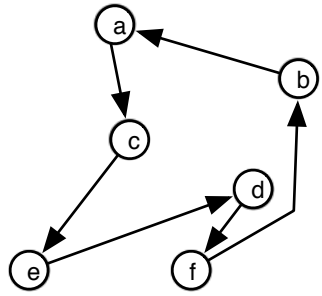
(B)



(C)



(D)



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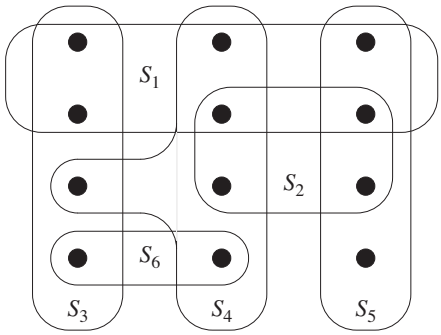
S_1
S_2
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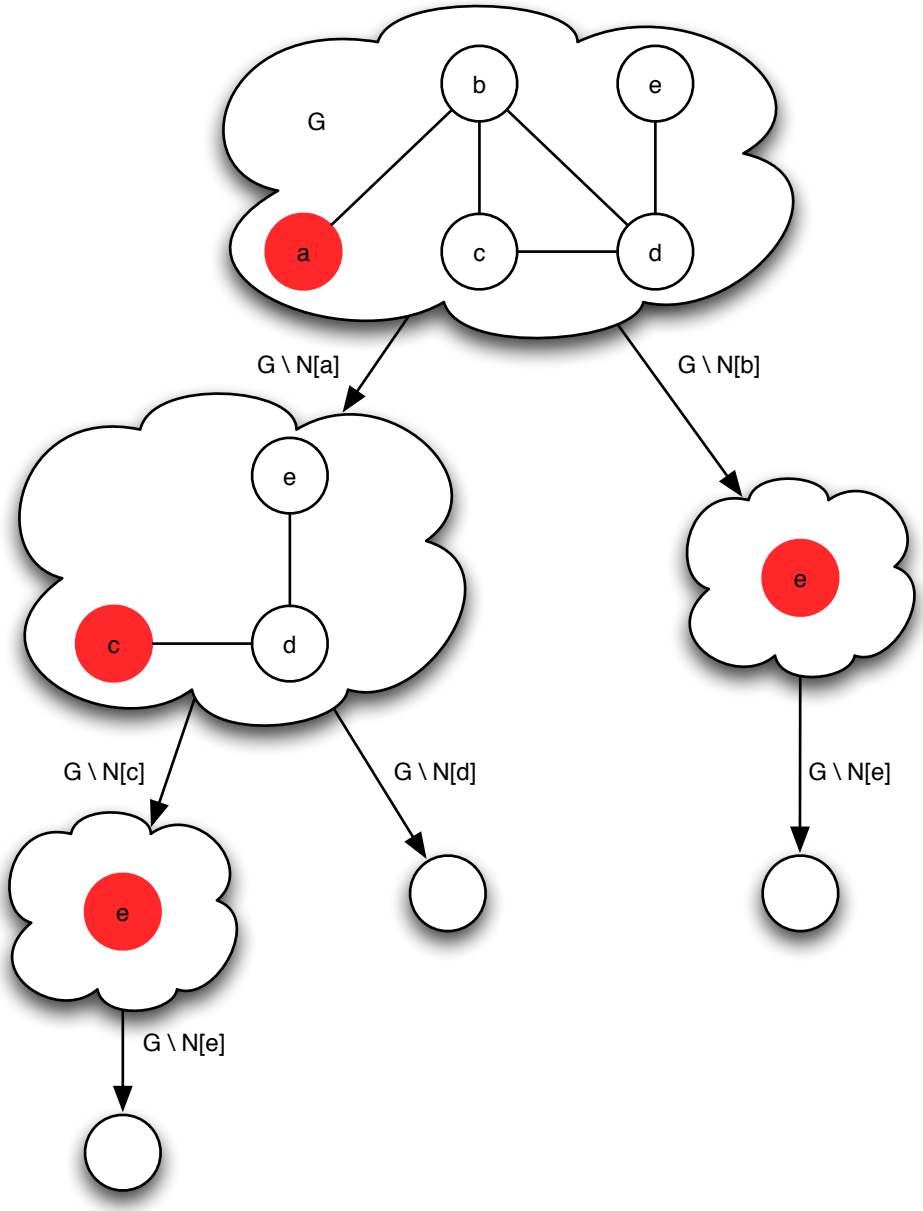
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