CS345 Theoretical Assignment 4

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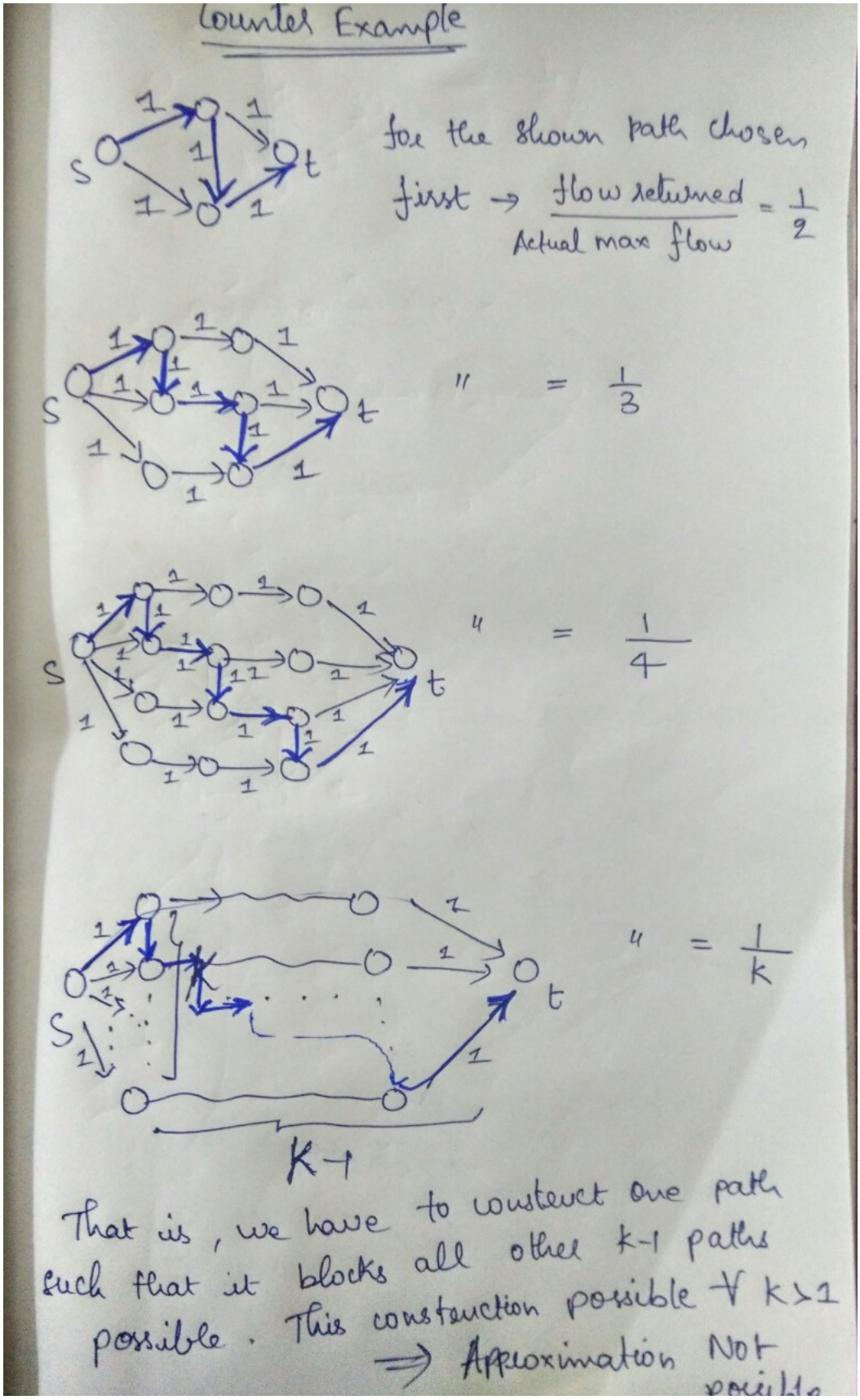
Contents

1 Any Guarantee of our First-Attempt Algorithm

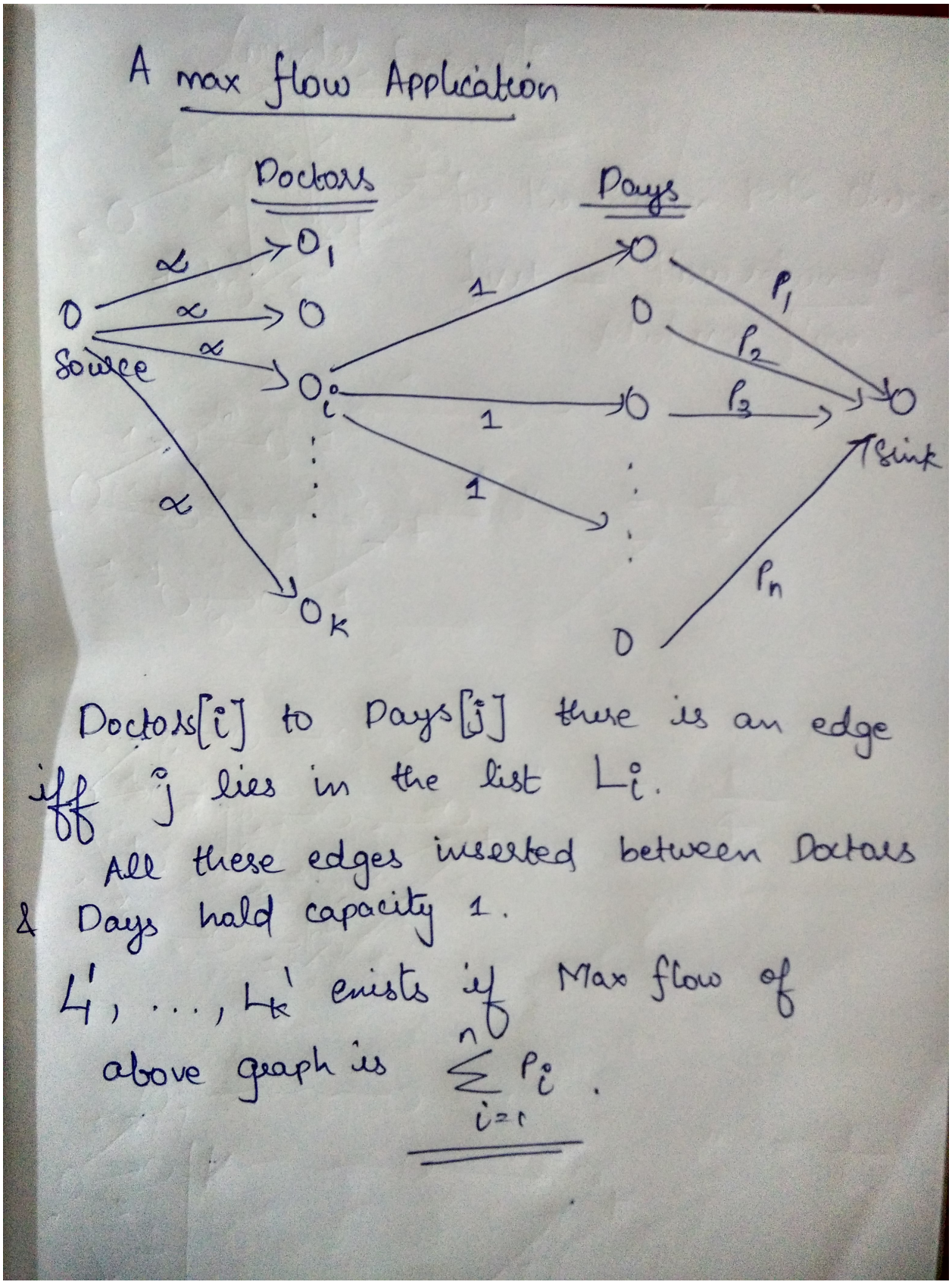
1.1 Counter Example



2 A max flow application

2.1 Without Extra Constraint

2.1.1 Overview



Doctors[i] to Days[j] there is an edge iff j lies in the list L_i.

All these edges inserted between Doctors & Days hold capacity 1.

$L_1', \ldots, L_k'$ exists if Max flow of above graph is $\sum_{i=1}^{n} p_i$.

2.1.2 Notations

p_i denotes the exact number of doctors required on day i
L_i denotes the list of days where doctor i is available
L_i' denotes the list of days that doctor i has to work to produce the required match. Note, $L_i' \subseteq L_i$
$D = \sum_{i=1}^{n} p_i$
n = Number of days in total
k = Number of Doctors in total

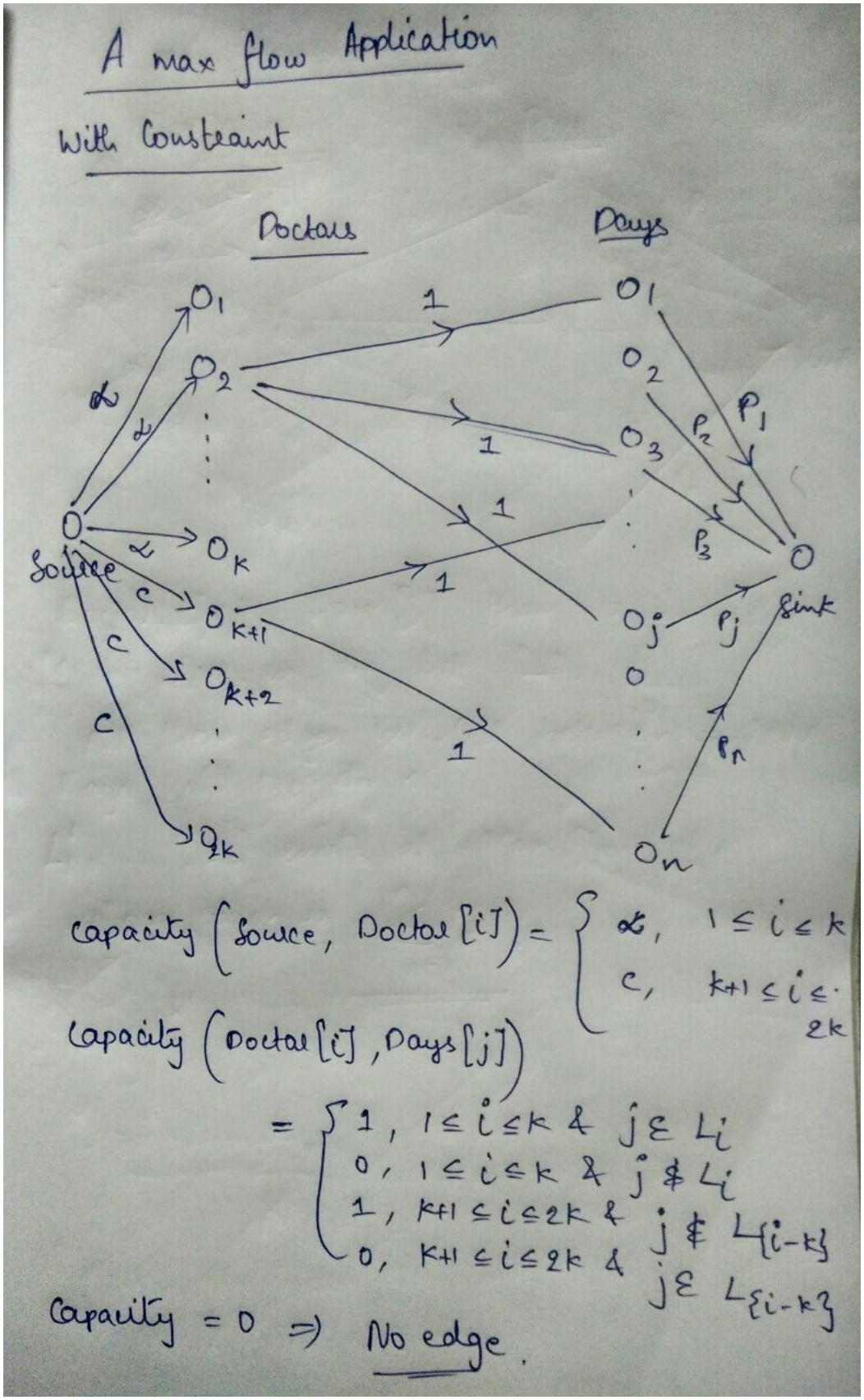
2.1.3 Claim

Construction of L_i's is possible if and only if the max-flow in the s-t graph is D.

2.1.4 Proof

2.2 With Extra Constraint

2.2.1 Overview



2.2.2 Claim

2.2.3 Proof