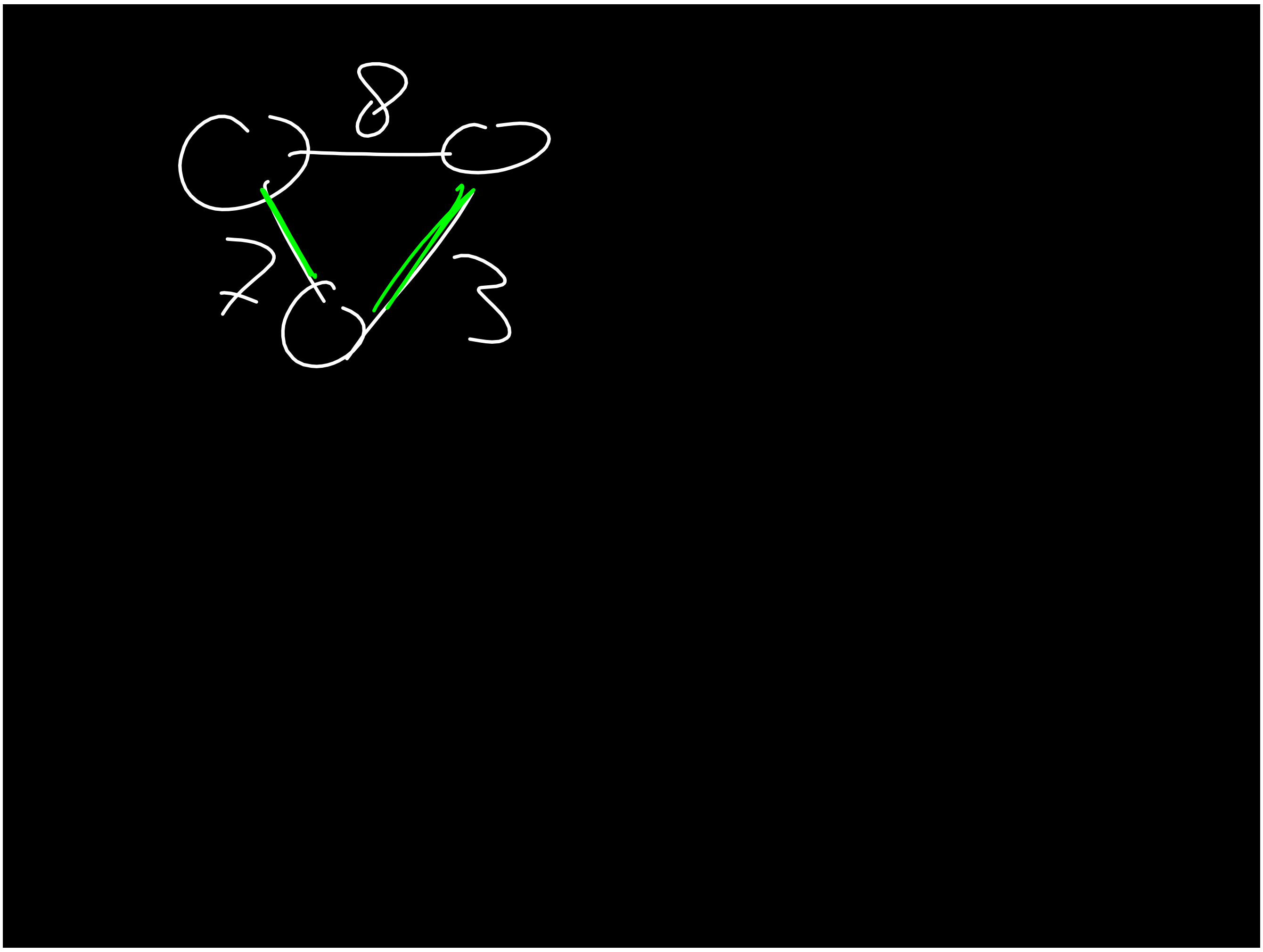
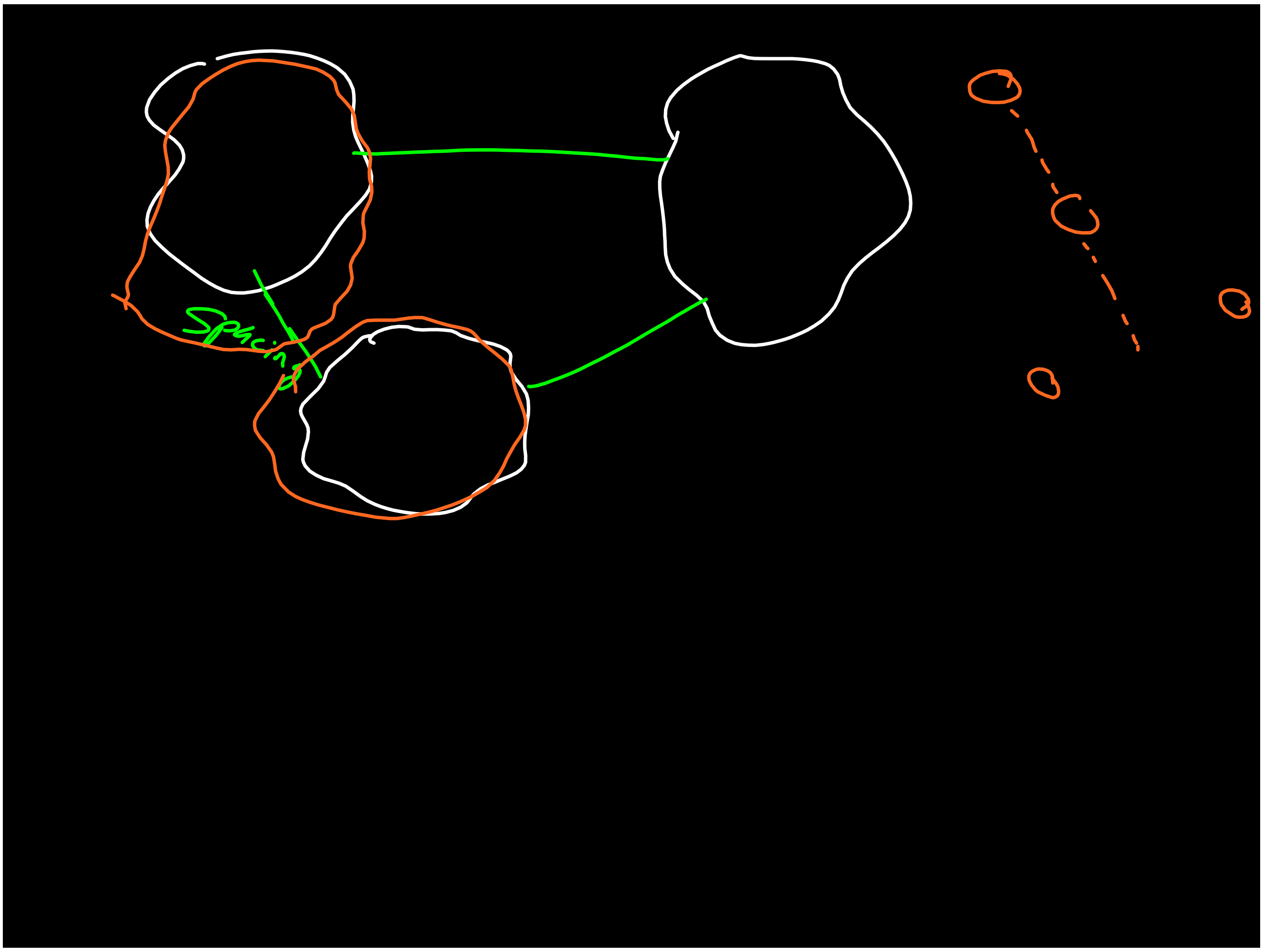
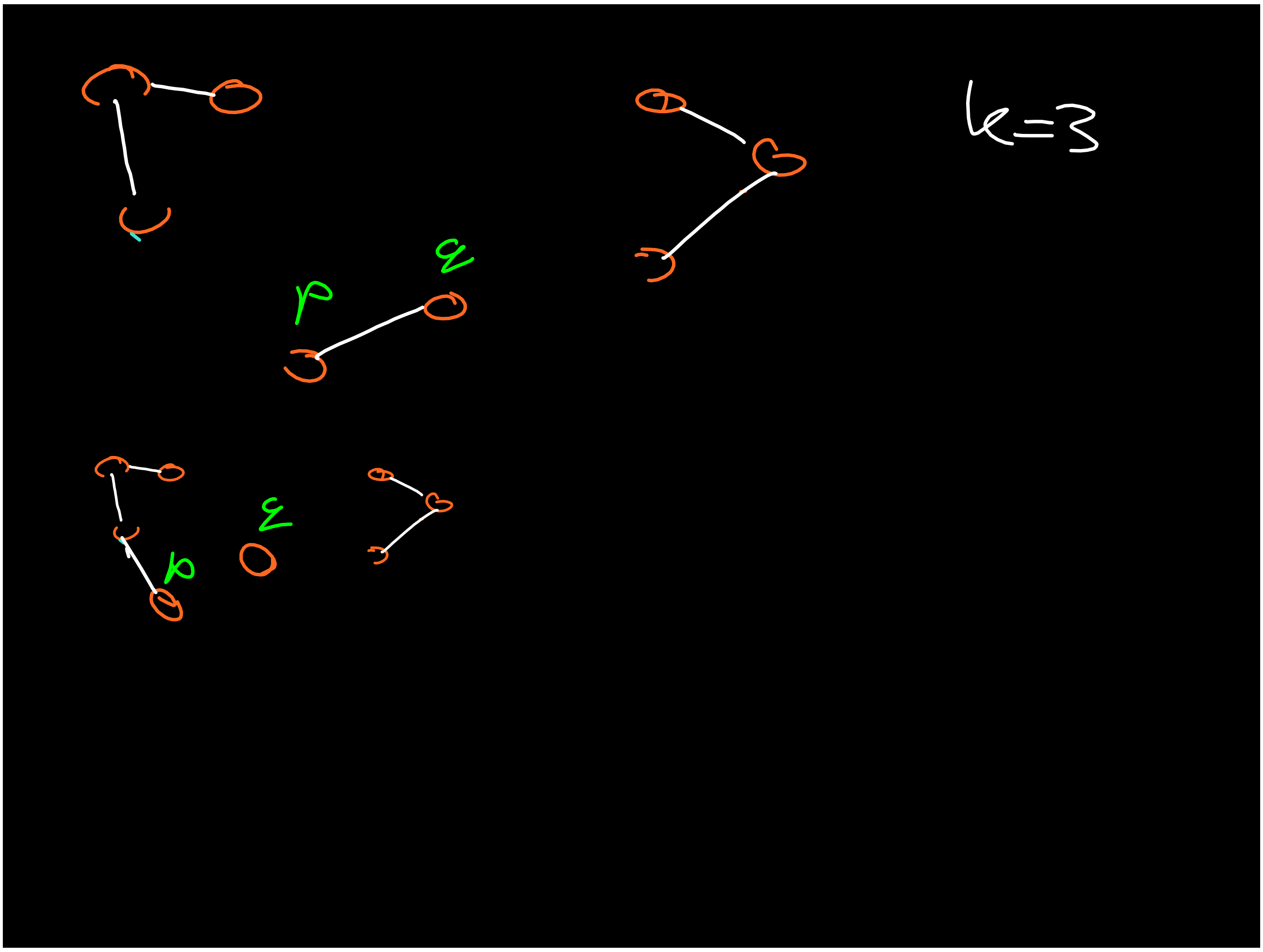
Let's try & fit everyone in Ampère again

Oh and for the first half, you do <u>NOT</u> need a laptop. Just Pen(cil) & paper.


8
7
3


Spacing


k=3
p
q
p
q

The Greedy Glossary

Dykstra: Find a shortest path

Greedy stays ahead: Proof technique (Induction)

Use PQs in implementation

Common Big Oh: $O(n \log n)$

Exchange Argument: Proof technique (as close to Greedy, switch even closer)

Sort input on some property

Union Find: Disjoint set structure.

$t_1 = 8$
$t_2 = 2$
$t_3 = 4$

Order : 1-2-3

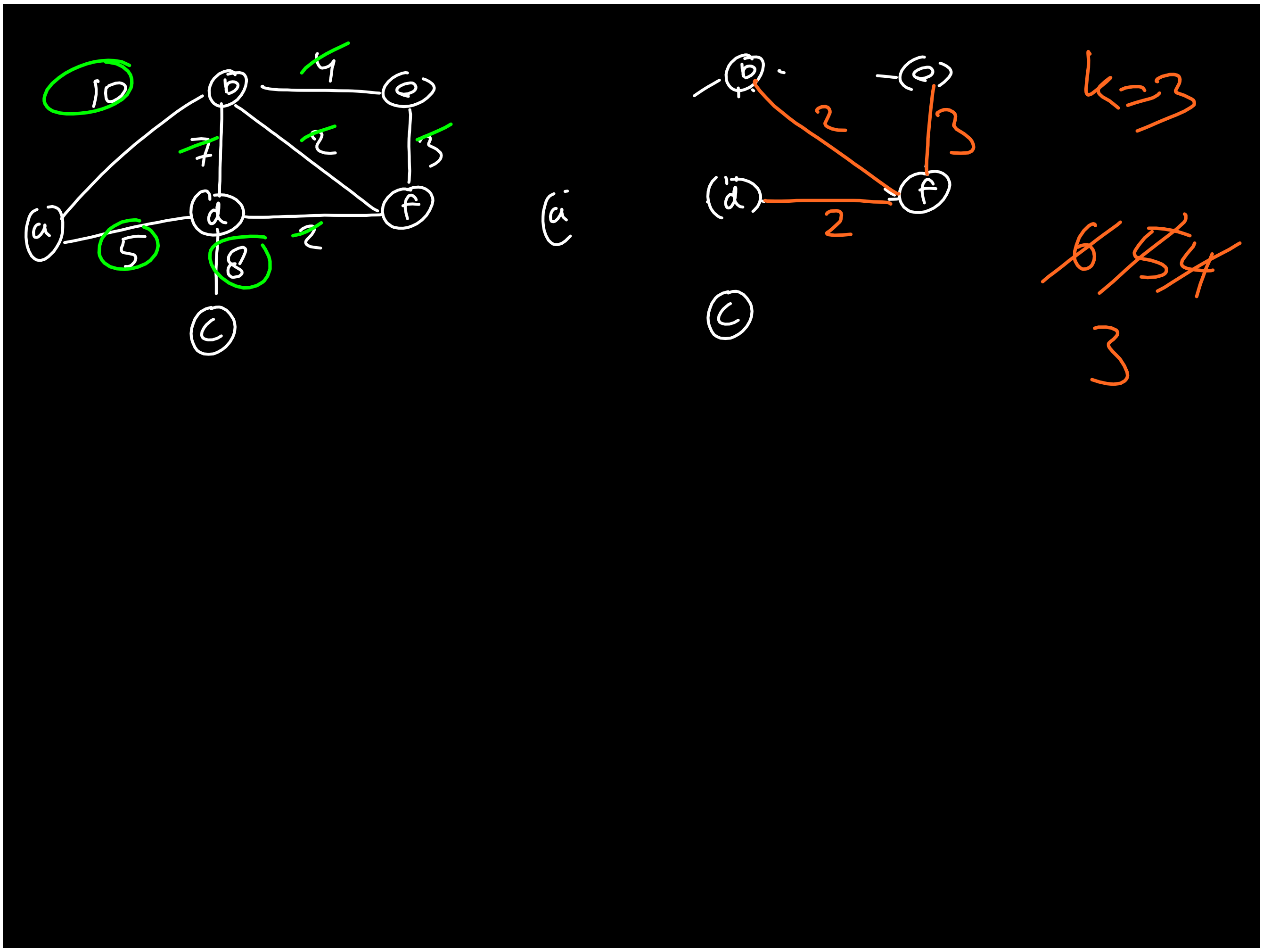
$f_1 = 8$
$f_2 = 10$
$f_3 = 14$

$$\frac{\Sigma f}{3} = \frac{8+10+14}{3} = 10\tfrac{2}{3}$$

order: 2-3-1

$f_1 = 14$
$f_2 = 2$
$f_3 = 6$

$$\frac{22}{3} = 7\tfrac{1}{3}$$


10
a
b
c
d
e
f
4
7
2
3
5
8
2
k=3
3

Let greedy solution be $\{g_1, \ldots, g_k\}$
Some optimal solution be $\{o_1, \ldots, o_m\}$

Claim: Greedy covers all houses and $k \leq m$

Proof: Greedy stays ahead

To prove $g_i \geq o_i$ whilst covering the same houses.

Base : $i = 1$ $\quad g_1 = x_1 + 5 \quad [x_1, x_1 + 10]$

o_1 covers x_1 and greedy is guaranteed to cover as least as many others

Inductive step

Assume $g_z \geq o_z$

T.P. $g_{z+1} \geq o_{z+1}$

Let x_r be the last house covered by g_z
then $g_{z+1} = x_{r+1} + 5$

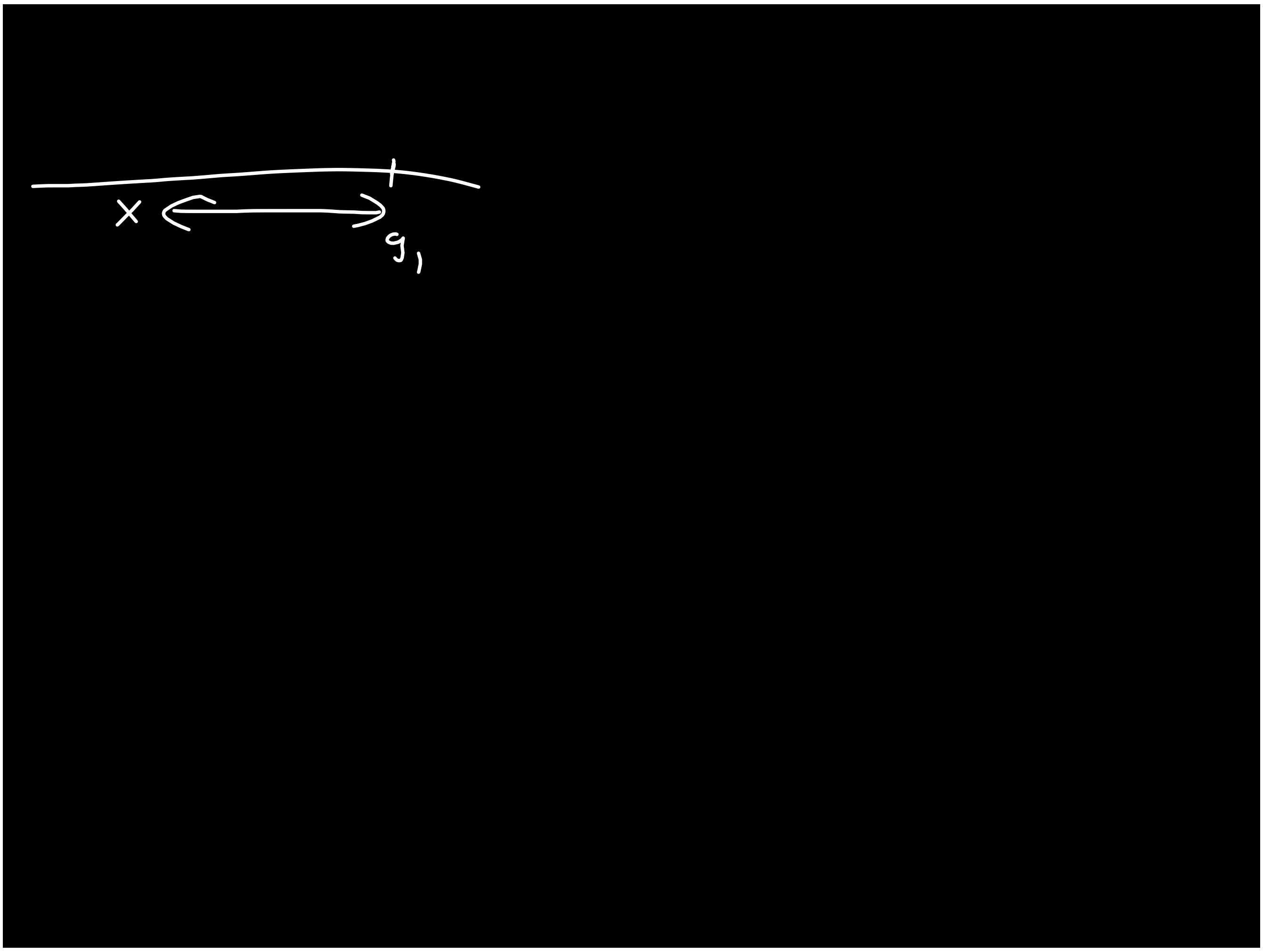
We know o_z also covered up to x_r
$x_{r+1} + 5$ is the furthest we can put the pub
So to cover x_{r+1} $\quad o_{z+1} \leq x_{r+1} + 5 = g_{z+1}$

100 50 20 1

1x 2x 1000x

70 40 1

1x 2x 1000 x


x
g1