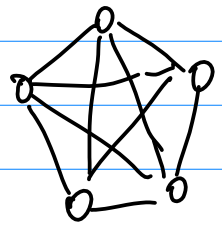
K_5 $|V| = 5$

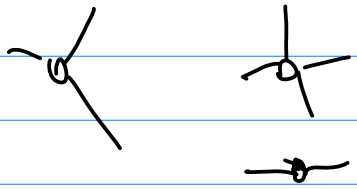
$|E| = \binom{5}{2} = 10$



$e \leq 3n - 6$

$10 \leq 15 - 6 = 9$

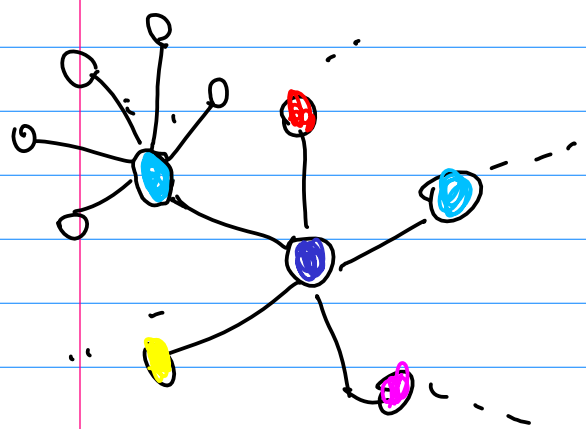
$\lightning$



$\sum d = 2e$

$d_{avg} = \frac{2e}{n}$

$\frac{2e}{n} \leq \frac{n6}{n} - \frac{12}{n}$



$K_{3,3}$ $|V| = 6$

$|E| = 9_{=3\cdot 3}$

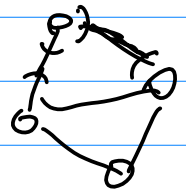
$K_{3,3}$?

$g \leq 3 \cdot 6 - 6 = 12$

$e \leq 2n - 4$

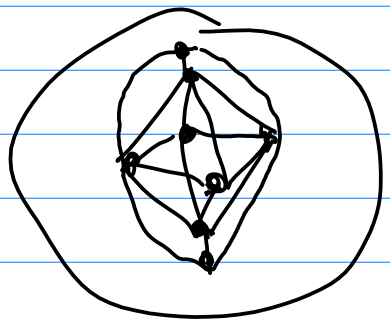
$g \leq 12 - 4 = 8$

$\lightning$



$\frac{2e}{n} \leq \frac{6n - 12}{n}$

$\leq 6 - \frac{12}{n}$



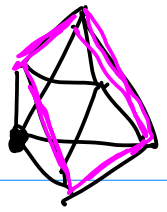
k degree of any vertex

l # of edges of each face

e # edges

n # vertices

f # faces



5 3eq.

$$n \cdot k = 2e$$

$$f \cdot l = 2e$$

$$n + f = e + 2$$

$$f = e - n + 2$$

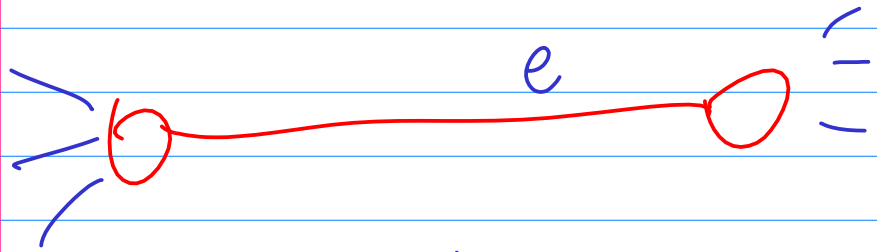
$$\frac{2e}{k} + \frac{2e}{l} - e = 2$$

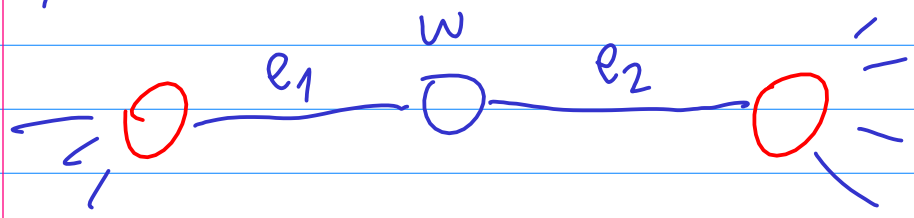
$$e\left(\frac{2}{k} + \frac{2}{l} - 1\right) = 2$$

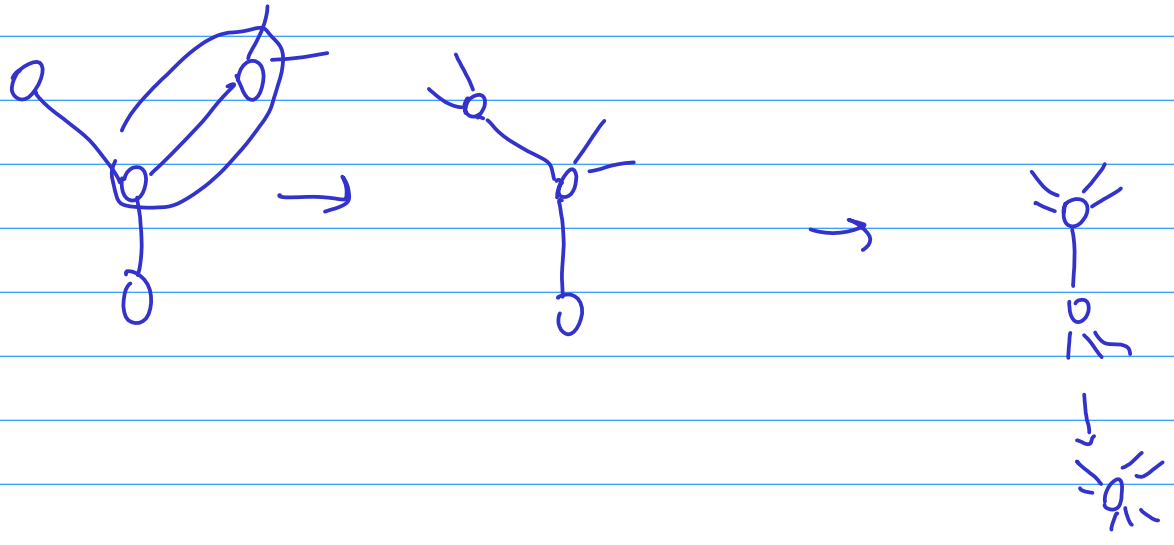
$$kl - 2k - 2l < 0$$

$$kl < 2k + 2l$$

$$1 < \frac{2}{l} + \frac{2}{k}$$


e


w
e1
e2



$f = e - n + 2$

$n = e - f + 2$

$f = e - n + 2$

	faces	edges	vert.
orig.	f	e	n
dual	n	e	f