5

4

3

2

1

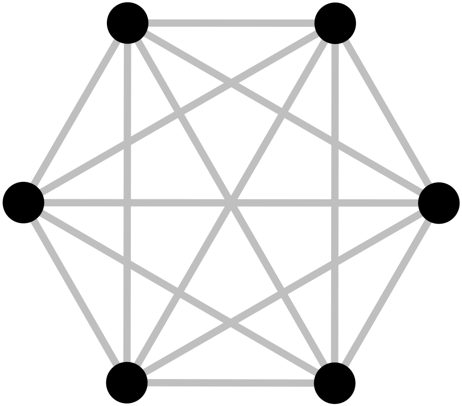

I'm an agent of chaos...

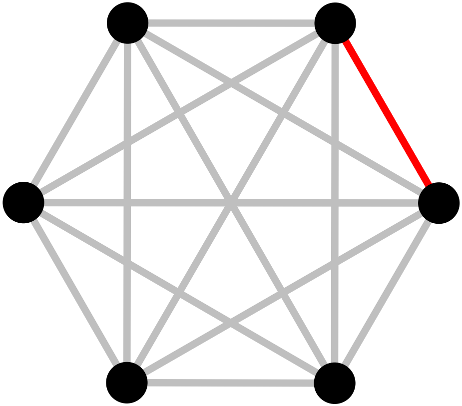

I'm an agent of chaos...
But, complete chaos is impossible!

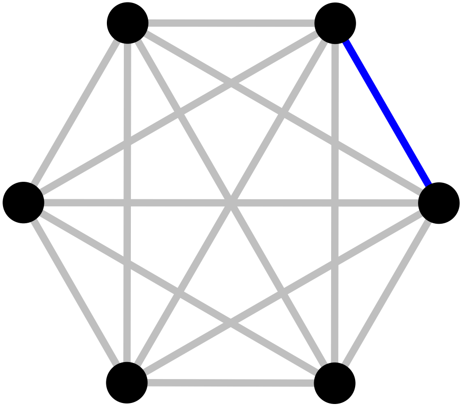

What are you talking freak?

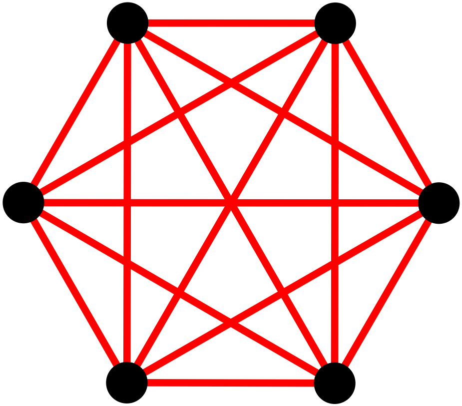

What are you talking freak?
I can prove it.

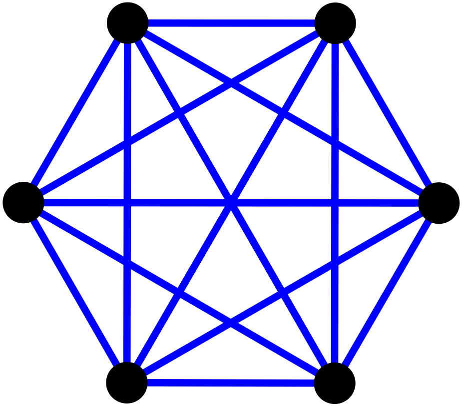
Complete Chaos is Impossible!

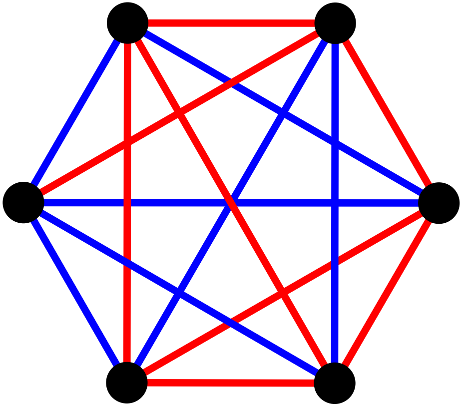


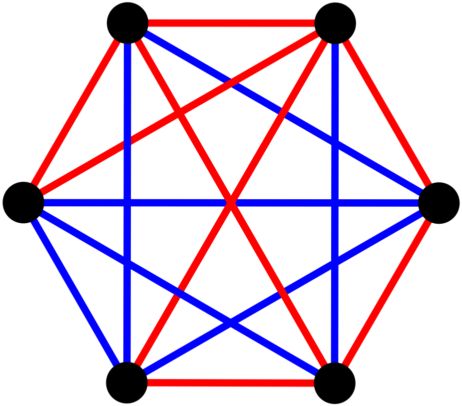


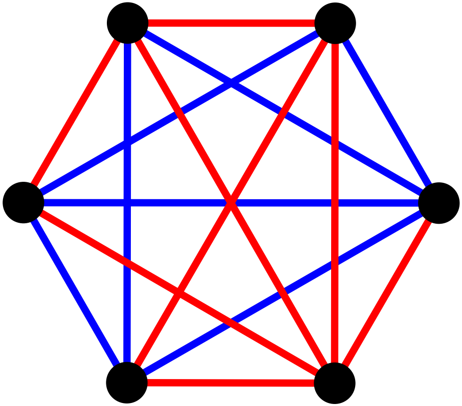


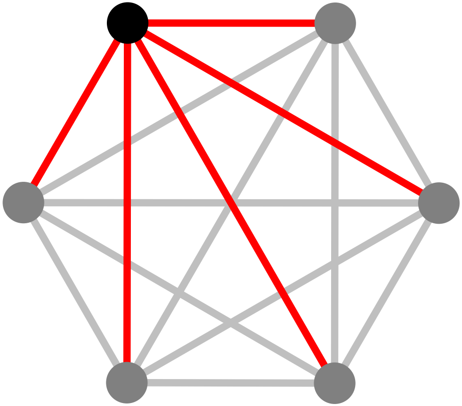


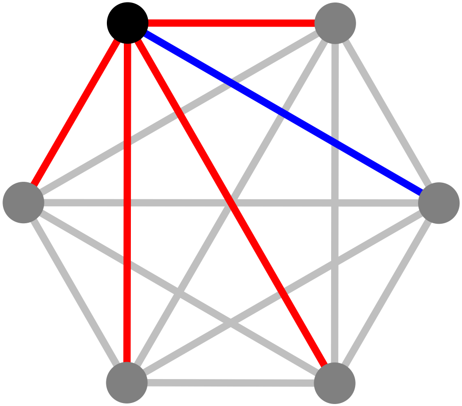


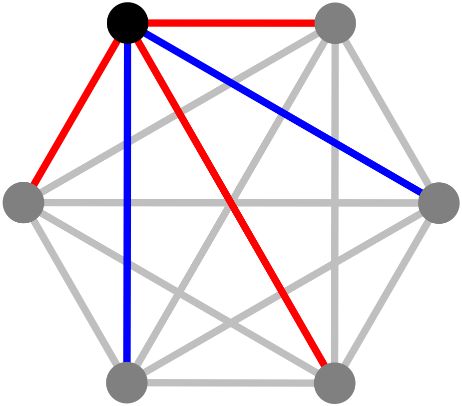


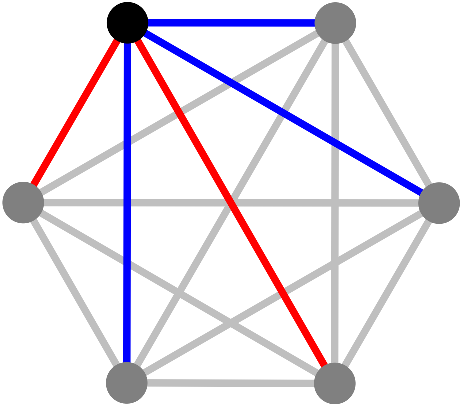


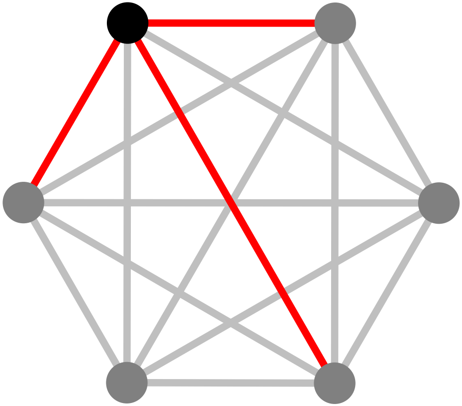


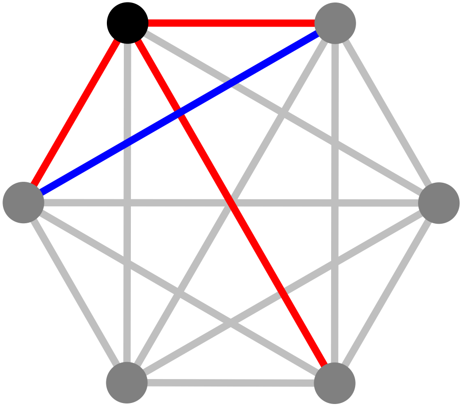


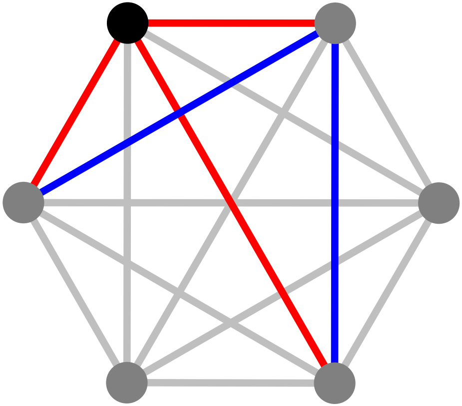


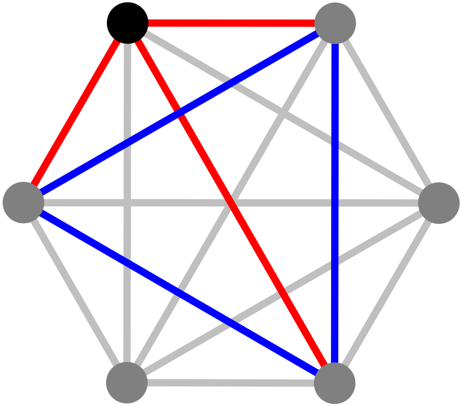


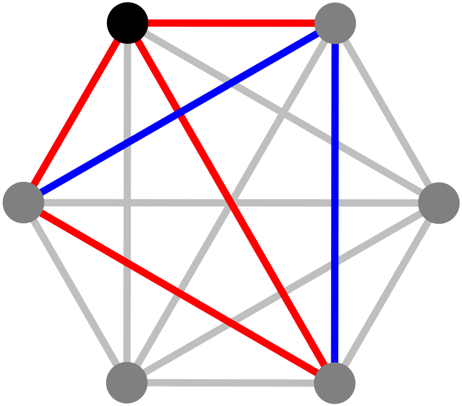


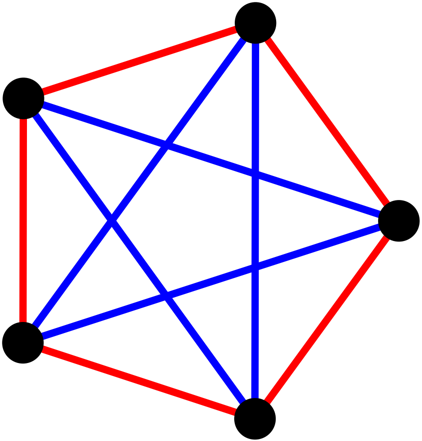


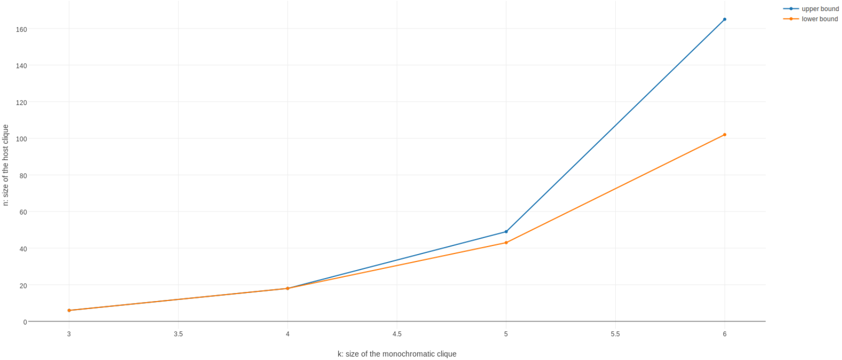




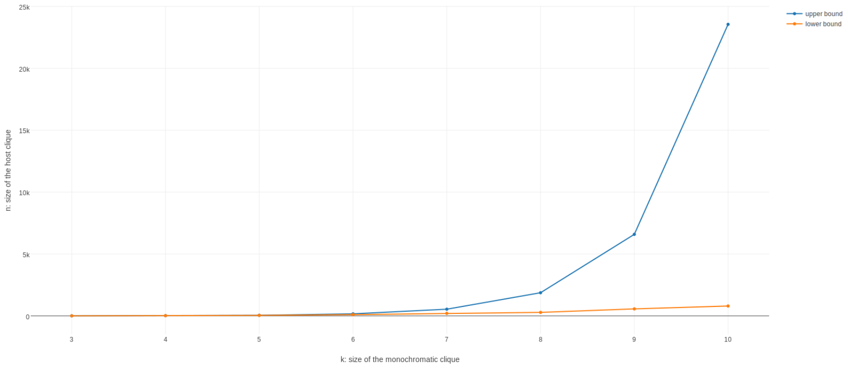




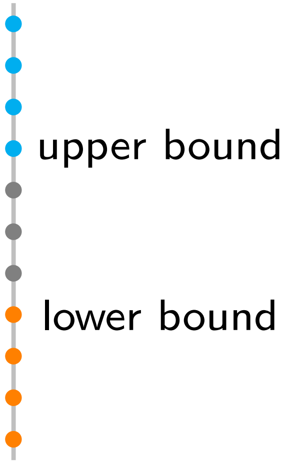




upper bound
lower bound
n: size of the host clique
k: size of the monochromatic clique
0
20
40
60
80
100
120
140
160
3
3.5
4
4.5
5
5.5
6



25k
20k
15k
10k
5k
0
n: size of the host clique
3
4
5
6
7
8
9
10
k: size of the monochromatic clique
upper bound
lower bound

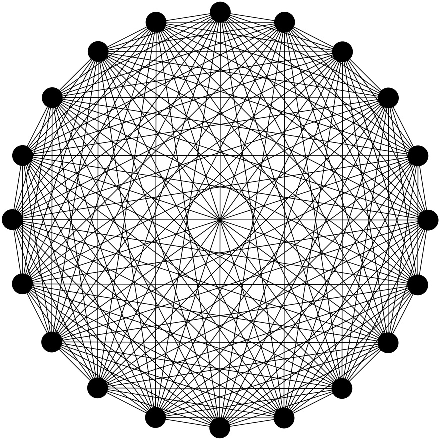

upper bound
lower bound

For every coloring it works.

For some coloring it doesn't.

$$\mathbb{P}\{E\} = 1$$

$$\mathbb{P}\{E\} < 1$$



Head

Tail

$$\mathbb{P}\{E\} < 1$$

$$\mathbb{P}\{\exists \textit{ monochromatic } K_k\} < 1$$

$$\mathbb{P}\{\bigcup_{A\subset V, |A|=k} A \text{ is monochromatic}\} < 1$$

$$\mathbb{P}\{\bigcup_{A\subset V,|A|=k} A \textit{ is monochromatic}\}$$

$$\leq$$

$$\sum_{A\subset V,|A|=k} \mathbb{P}\{A \textit{ is monochromatic}\}$$

$$\mathbb{P}\{\textit{A is monochromatic}\}$$

$$\mathbb{P}\{\textit{A is monochromatic}\}$$

$$=$$

$$\mathbb{P}\{\textit{A is red}\} + \mathbb{P}\{\textit{A is blue}\}$$

$$\mathbb{P}\{\textit{A is monochromatic}\}$$

$$=$$

$$\mathbb{P}\{\textit{A is red}\} + \mathbb{P}\{\textit{A is blue}\}$$

$$=$$

$$2\mathbb{P}\{\textit{A is red}\}$$

$$\mathbb{P}\{A \textit{ is red}\}$$

$$\mathbb{P}\{A \textit{ is red}\}$$

$$=$$

$$\left(\frac{1}{2}\right)^{\binom{k}{2}}$$

$$\mathbb{P}\{\textit{A is monochromatic}\}$$

$$=$$

$$\mathbb{P}\{\textit{A is red}\} + \mathbb{P}\{\textit{A is blue}\}$$

$$=$$

$$2\mathbb{P}\{\textit{A is red}\}$$

$$\mathbb{P}\{A \textit{ is monochromatic}\}$$

$$=$$

$$\mathbb{P}\{A \textit{ is red}\} + \mathbb{P}\{A \textit{ is blue}\}$$

$$=$$

$$2\left(\frac{1}{2}\right)^{\binom{k}{2}}$$

$$\mathbb{P}\{\bigcup_{A\subset V,|A|=k} A \textit{ is monochromatic}\}$$

$$\leq$$

$$\sum_{A\subset V,|A|=k} \mathbb{P}\{A \textit{ is monochromatic}\}$$

$$\mathbb{P}\{\bigcup_{A\subset V, |A|=k} A \textit{ is monochromatic}\}$$

$$\leq$$

$$\sum_{A\subset V, |A|=k} \mathbb{P}\{A \textit{ is monochromatic}\}$$

$$=$$

$$\binom{n}{k} 2 \left(\frac{1}{2}\right)^{\binom{k}{2}}$$

$$\binom{n}{k} 2 \left(\frac{1}{2}\right)^{\binom{k}{2}} < \frac{2^{k/2+1}}{k!} \frac{n^k}{2^{k^2/2}} < 1$$

$$\binom{n}{k} 2 \left(\frac{1}{2}\right)^{\binom{k}{2}} < \frac{2^{k/2+1}}{k!} \frac{n^k}{2^{k^2/2}} < 1$$

$$n < 2^{k/2}$$

Frank Plumpton Ramsey
1903 – 1930