

5

4


3

2

1









I'm an agent of chaos...

But, complete chaos  
is impossible!



A comic book style illustration of the Joker and Batman. The Joker, on the left, has white face paint, dark eye sockets, and a wide, red, bloody grin. He is wearing a green suit jacket over a dark, patterned shirt. He is gesturing with his right hand towards Batman. Batman, on the right, is shown in silhouette, wearing his iconic cowl with pointed ears. The background is a blurred cityscape. A yellow speech bubble is positioned above the Joker's head.

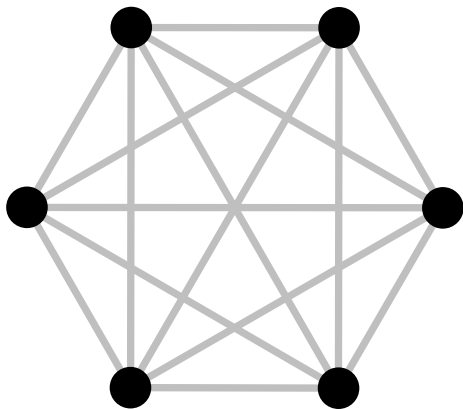
What are you talking freak?

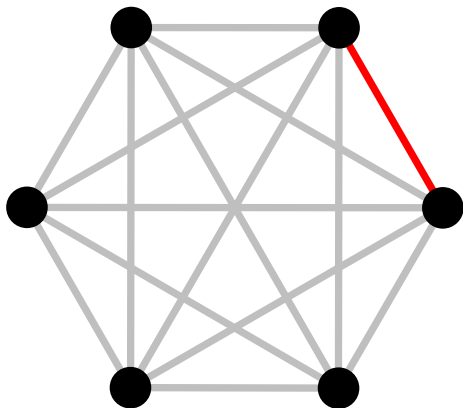


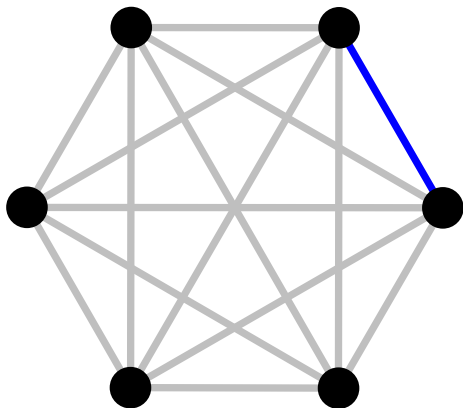
What are you talking freak?

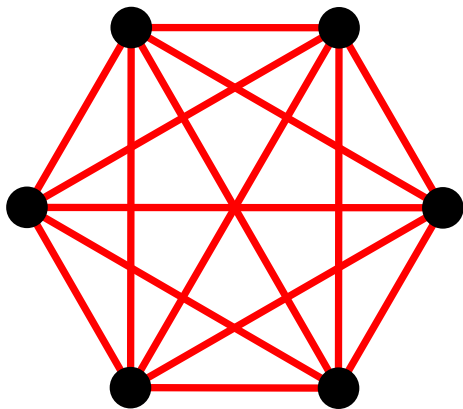
I can prove it.

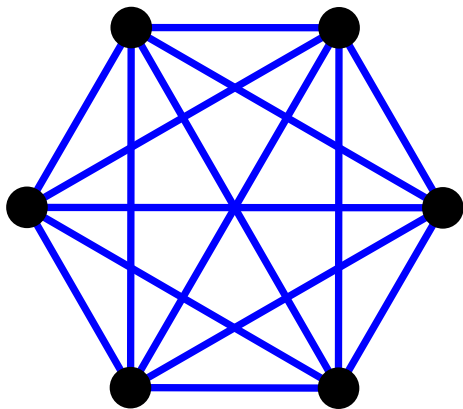
Complete Chaos is Impossible!



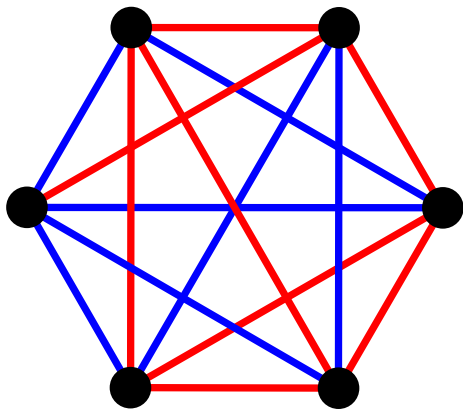


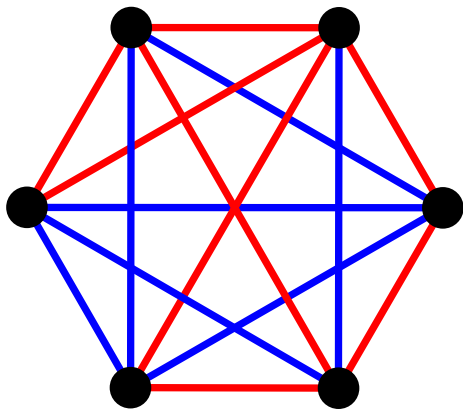


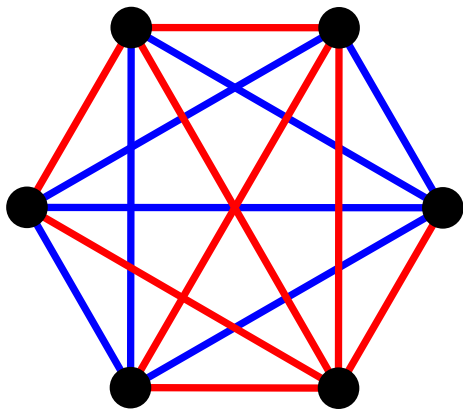


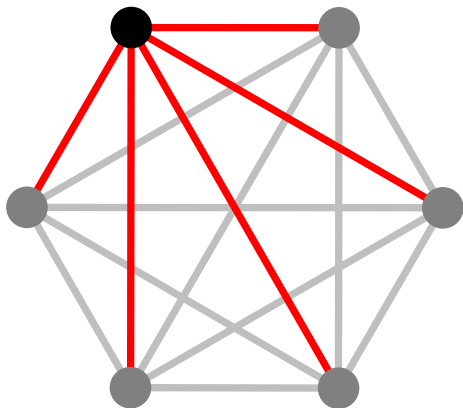


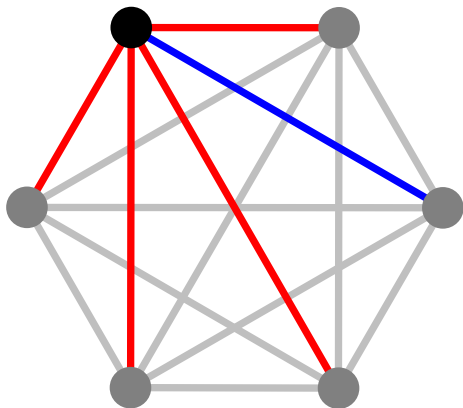


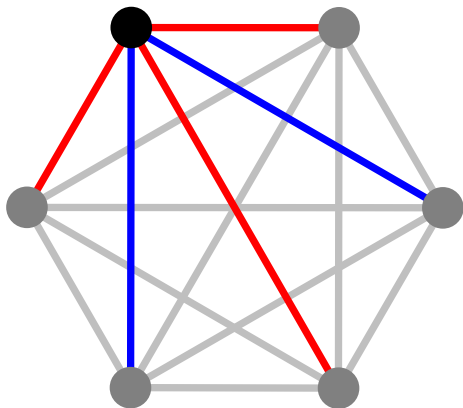


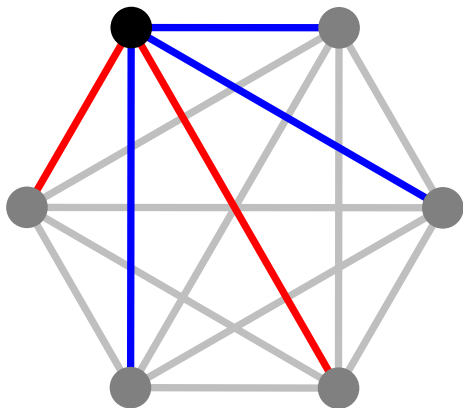


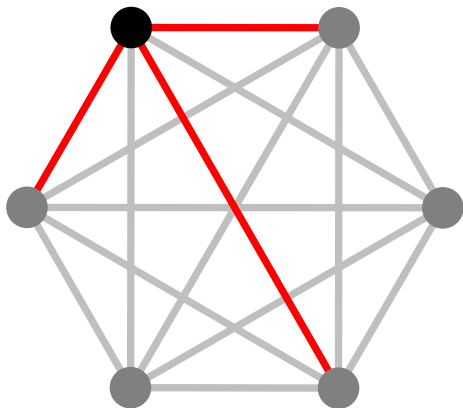




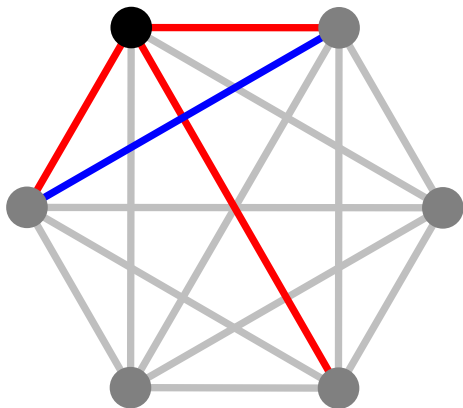


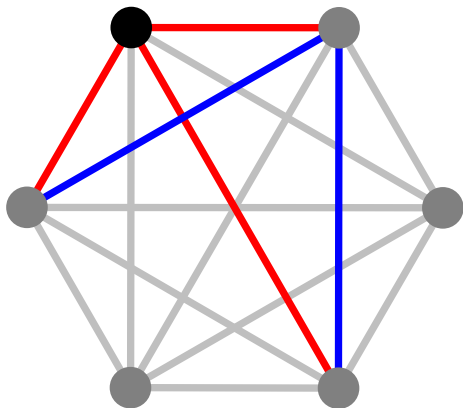


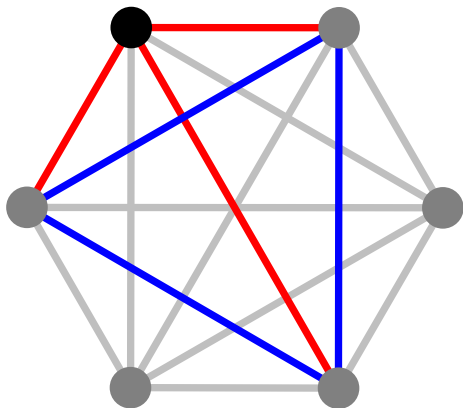


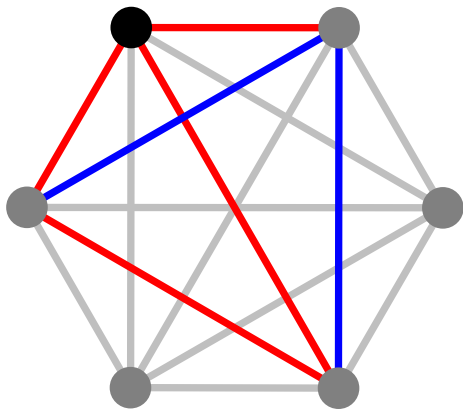


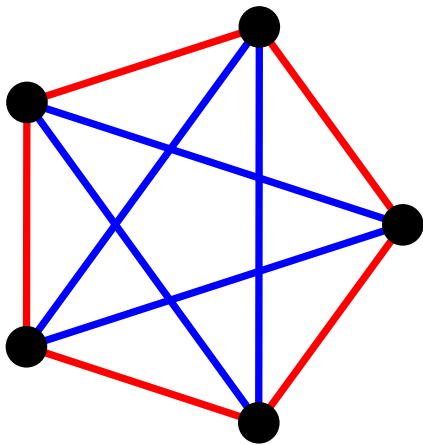


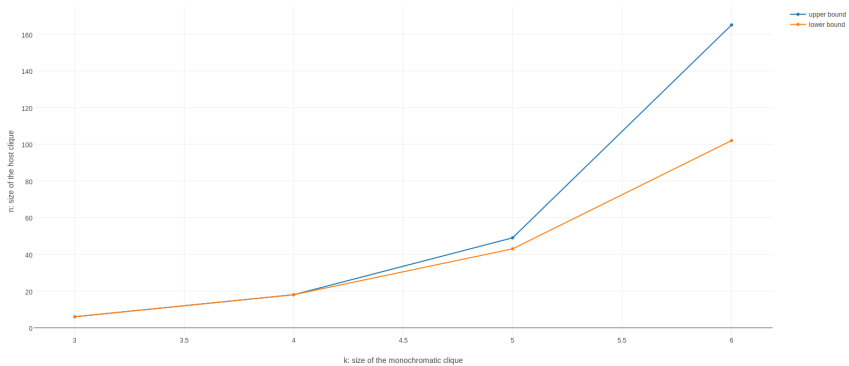


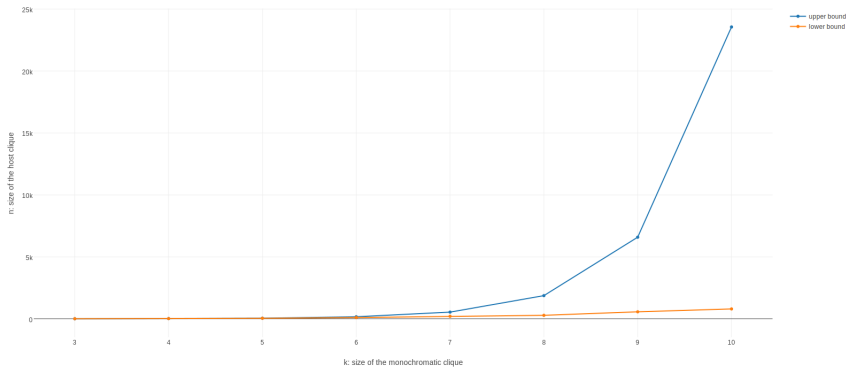


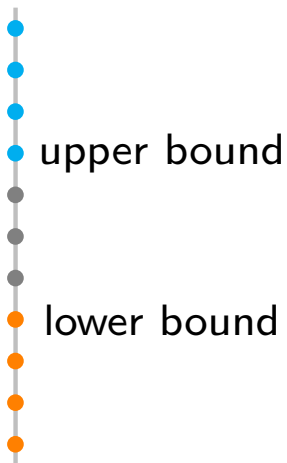














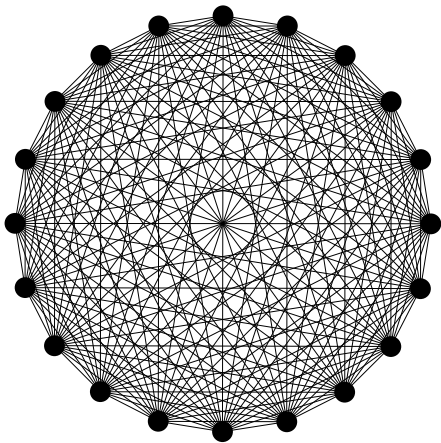


*For every coloring it works.*

*For some coloring it doesn't.*

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

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



# Head



Tail



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

$$\mathbb{P}\{\exists \text{ *monochromatic* } K_k\} < 1$$



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

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

$$\leq$$

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

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

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

$$=$$

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

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

$$=$$

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

$$=$$

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

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

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

$$=$$

$$\binom{1}{\frac{1}{2}}^{\binom{k}{2}}$$

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

$$=$$

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

$$=$$

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



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

$$=$$

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

$$=$$

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

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

$$\leq$$

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

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

$$\leq$$

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

$$=$$

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

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

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

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





Frank Plumpton Ramsey  
1903 – 1930