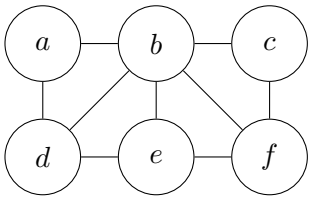
# 1 Grab the props!

Form a group of 3-4 people with your neighbors. Then, grab the following from Eric:

- *Three* color pencils (call them $c_0$, $c_1$, and $c_2$).
- One fair, six-sided die.

# 2 Coloring time!

For each vertex in the following graph, roll the die one time (say you get $x$), then color the vertex with color $c_{x \bmod 3}$.




# 3 Colorful edges

An edge is said to be *colorful* if its endpoints have different colors. Based on your random coloring in Section 2, count the number of colorful edges in the graph.

# 4 Expected number of colorful edges

Formulate this as a probability problem: Suppose each vertex has probability 1/3 of being colored with $c_0$, $c_1$, or $c_2$. Let $X$ denote the number of colorful edges in the graph after a random coloring. Find $\mathbb{E}[X]$.

*Hint*: First define indicator random variables that you can apply linearity of expectation later.