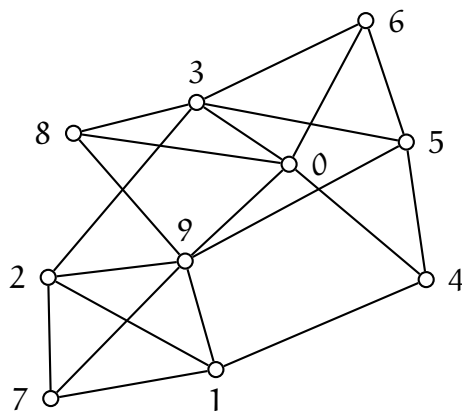


## Math589 Homework 7

1. [1pt] Show that for any 3-connected graph  $G \neq K_4$  contains an edge  $xy$  such that  $G/xy$  (the contraction) is still 3-connected. (Read Lemma 3.2.4 and write it in your own words.)

**Solution.**

2. [1pt] Let  $G$  be the graph below. Find an edge  $e$  such that  $G/e$  is 3-connected. (In case that you needed, the graph6 string of the graph is ILo[jA0xW.)



**Solution.**

Questions to ponder:

1. Let  $G$  be a graph. Google how to use SageMath to find the connectivity of  $G$ . You may use SageCell to try your code.
2. Let  $G$  be a graph and  $e$  an edge of  $G$ . Find a function (or write your own function) to use SageMath to construct the graph  $G/e$ . You may use SageCell to try your code.
3. Suppose  $G$  is 3-connected. Write a function to find all edges  $e$  of  $G$  such that  $G/e$  is 3-connected.
4. Practice your  $\text{\TeX}$ nique at <https://texnique.xyz/>.