

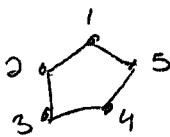
Attendance Quiz for Lecture 12

NAME: (print!) April Rinzo

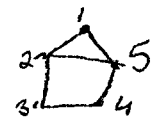
E-MAIL ADDRESS: (print!) ajp419@scarletmail.rutgers.edu

1. Prove that K_5 is non-planar.

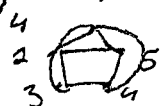
Pf: Draw the largest cycle in K_5



Without loss of generality, draw $\{2, 5\}$ inside the cycle



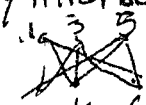
Then $\{1, 3\}$ and $\{1, 4\}$ must be drawn outside the cycle.



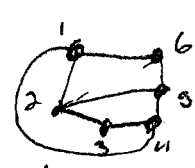
Then if $\{2, 4\}$ and $\{3, 5\}$ are both drawn inside the cycle, they intersect. Thus, at least one of $\{2, 4\}$, $\{3, 5\}$ must be drawn outside the cycle.

If $\{2, 4\}$ is drawn outside the cycle it intersects $\{1, 3\}$. If $\{3, 5\}$ is drawn outside the cycle, it intersects $\{1, 4\}$. Therefore K_5 can not be drawn without any intersections and is non-planar. \square

2. Prove that $K_{3,3}$ is non-planar.



Pf: Draw the largest cycle in $K_{3,3}$.



Without loss of generality, draw $\{2, 5\}$ inside the cycle.

Then $\{1, 4\}$ must be drawn outside.

If $\{3, 6\}$ is drawn inside the cycle, it intersects with $\{2, 5\}$

If $\{3, 6\}$ is drawn outside the cycle, it intersects with $\{1, 4\}$

Therefore $K_{3,3}$ cannot be drawn without any intersections and is non-planar. \square