

Problem sheet 9

Due Monday, June 25th at 17:30.

Question 1

For a positive integer n let nK_3 denote the vertex disjoint union of n copies of K_3 .

- (a) Prove that there is a unique coloring of K_5 without monochromatic K_3 (up to isomorphism and renaming of colors).
- (b) Prove that $r(K_3, 2K_3) = 8$.
- (c) Prove that $r(sK_3, tK_3) = 2s + 3t$ for all $t \geq s \geq 1, t \geq 2$.
(**Hint:** Use $r(2K_3, 2K_3) = 10$ without proof.)

Question 2

- (a) Calculate $r(C_3, C_4)$.
- (b) Calculate $r(C_4, C_4)$.

Question 3

Let G be a graph on n vertices and let P_3 be the path with 3 vertices.

- (a) Calculate $r(P_3, G)$ if there is a perfect matching in the complement of G .
- (b) Calculate $r(P_3, G)$ if there is no perfect matching in the complement of G .