

**Graph Theory and Combinatorics MATH-42021/52021.**

**Home Work 10, due on MONDAY, July 18**

**Instructor: Prof. Artem Zvavitch**

**5 problems, 3pts each, YES 5 points extra!**

**Problem 1.** Find a compact form for generating function of the sequence  $4, 4, 4, 4, 1, 0, 1, 0, 1, 0, 1, 0, \dots$

**Problem 2.** Find a compact form for generating function of the sequence  $1, 8, 27, \dots, k^3, \dots$

**Problem 3.** Find the coefficient of  $x^{25}$  in  $(1 + x + x^8)^{10}$

**Problem 4.** Find the coefficient of  $x^{12}$  in

$$(1 - x^2)^{-5},$$

what can you set about the coefficient of  $x^{17}$

**Problem 5.** Build a generating function for  $a_r$ , the number of integer solutions to the equation

$$e_1 + e_2 + e_3 + e_4 = r; \quad 2 \leq e_i \leq 8, \quad e_1 \text{ is even, } e_2 \text{ is odd.}$$