

DISCRETE MATHEMATICS

HOMEWORK 6

- (1) How many 8-digit numbers are there whose digits are from $\{1, 2, 3, 4, 5, 6\}$ such that each digit occurs at least once?
- (2) How many numbers $1 \leq n \leq 1000$ are not a perfect square? How many are neither perfect squares nor cubes?
- (3) Find the number of integer solutions for the following equations:
 - (a) $x_1 + x_2 + x_3 + x_4 = 20$, $0 \leq x_i \leq 7$.
 - (b) $x_1 + x_2 + x_3 + x_4 = 20$, $x_i \geq 0$, x_2 and x_3 even.
 - (c) $x_1 + x_2 + x_3 + x_4 + x_5 = 30$, $2 \leq x_1 \leq 4$, $3 \leq x_i \leq 8$ for $i = 2, 3, 4, 5$.
 - (d) $x_1 + x_2 + x_3 + x_4 + x_5 = 30$, $x_i \geq 0$, x_2 even, x_3 odd.
- (4) Find the coefficient of x^{50} in $(x^7 + x^8 + x^9 + \dots)^6$.
- (5) Find the coefficient of x^{15} in $\frac{x^3 - 5x}{(1-x)^3}$.