

MATH/EECS 1028: DISCRETE MATH FOR ENGINEERS  
WINTER 2015  
Assignment 3 (Released March 29, 2017)  
Submission deadline: 5:00 pm, April 5, 2017

Notes:

1. The assignment can be handwritten or typed. It MUST be legible.
2. You must do this assignment individually.
3. Submit this assignment only if you have read and understood the policy on academic honesty on the course web page. If you have questions or concerns, please contact the instructor.
4. Use the dropbox near the EECS main office to submit your assignments, OR submit your assignment in the first TEN minutes of class on the day of the deadline. No late submissions will be accepted. Please do not send files by email.
5. Your answers should be precise and concise. Points may be deducted for long, rambling arguments.
6. Assume  $\mathbb{R}$  to denote the real numbers,  $\mathbb{Z}$  to denote the set of integers  $(\dots, -2, -1, 0, 1, 2, \dots)$  and  $\mathbb{N}$  to denote the natural numbers  $(1, 2, 3, \dots)$ .

## Question 1

[5 points] Find the coefficient of  $x^4$  in the expansion of  $(1 + 2x + 3x^3)^{10}$ ?

## Question 2

[5 points] In how many ways can we seat 8 men and 3 women on a row of seats so that no two women sit next to each other?

## Question 3

[5 points] Prove the following statement first by using formulas and second by using a counting argument. (Thus you will write two different proofs for the statements).

$$\binom{n}{k} \binom{n-k}{j} = \binom{n}{j} \binom{n-j}{k}.$$

## Question 4

[5 points] Prove that among any 54 integers  $1 \leq x_1 < x_2 < x_3 < \dots < x_{54} \leq 100$ , there is a pair with difference 12.