

**MATH 10B – Spring 2019**  
**Quiz 1 – Prepared by John Yirong Zhen**  
**Date:02/05/2018**

You are to finish this quiz in 10 minutes. You are allowed one single-sided letter-size cheat sheet. No calculators or other notes/books/devices are allowed.

Your cheatsheet must be handwritten by you, no photocopying or preprinted (unless you have written permission from the instructor). Try your best! Stay calm and good luck!

**I. True/False (2 pts)**

Circle T or F in the space provided in front of the statement to indicate whether it is true or false respectively. You get +1 for a correct answer, -1 for incorrect, and 0 for leaving it blank. (You should not guess if you don't know the answer.)

You do not need to justify your answers for T/F statements.

- ①    F     $\binom{n-1}{k-1} + \binom{n-1}{k} = \binom{n}{k}$  for  $n, k \geq 1$ .
- T    ②    After we expand  $(2x + y)^6$ , the coefficient of  $x^3y^3$  is 20.

**II. Written problems (10pts)**

- You **MUST justify your answer** to undoubtably convince me that you solved and not guessed it. Partial credit will be given to good work and progress even if there is no final answer or the answer is incorrect. On the other hand, bogus justification for a correct answer will receive a 0.
- Keep your scratch work separate. Cross out writing you don't want to be graded and clearly label the parts you want to be graded.
- Points will be deducted for incorrect writings that you "forget to cross out."

See problem on back.

How many bit strings contain exactly five 0s and 13 1s if every 0 must be immediately followed by two 1s?

First we can clustered two 1s and a 0, and we have  $-011-011-011-011-011-$ . Then, we will have three 1s left.

First, the 1s can go together into one of those 6 slots. There are 6 such arrangements.

Then, two 1s can occupy a slot and the third 1 takes another slot. There are  $P(6, 2)$  such arrangements.

Finally, all three 1s can go to different slots. There are  $C(6, 3)$  such arrangements.

In total, there are  $6 + P(6, 2) + C(6, 3) = 6 + 30 + 20 = 56$  different arrangements.