

Name: _____

Student ID: _____

Section: _____

Instructions. Grading is based on method. SHOW ALL WORK.

Please email your solutions to hensh@msu.edu by 12:30PM on Wednesday (2025-07-09). Please use the subject line: **Math 481 - Quiz 03** and make sure that your name appears on your solution.

1. (10 points) A standard deck of 52 playing cards contains 4 suits $\{\clubsuit, \diamondsuit, \heartsuit, \spadesuit\}$, with 13 cards in each suit. How many cards must be drawn (at random) to guarantee 3 cards from the same suit. *Justify your claim.*
2. (10 points) Let $\mathfrak{J} \subset 2^{[n]} \times 2^{[n]}$ denote the set of all ordered pairs (A, B) with $A \cap B \neq \emptyset$. For example, for $n = 8$, we let $A = \{1, 2, 5\}$ and $B = \{1, 5\}$. Then $A \cap B = \{1, 5\}$ so that (A, B) and (B, A) are distinct elements in \mathfrak{J} . Find $|\mathfrak{J}|$.