

This problem set covers material from Week 1, dates 2/10- 2/14. Textbook problems (if assigned) can be found at the end of the corresponding chapter.

Instructions: Write or type complete solutions to the following problems and submit answers to the corresponding Canvas assignment. Your solutions should be neatly-written, show all work and computations, include figures or graphs where appropriate, and include some written explanation of your method or process (enough that I can understand your reasoning without having to guess or make assumptions). A general rubric for homework problems appears on the final page of this assignment.

Monday 2/10

None!

Wednesday 2/12

1. We roll three six-sided dice. The sides of each die are numbered 1-6. Let A be the event that the first die shows an even number, B the event that second die shows an even number, and C the event that the third die shows an even number. Also define event A_i as the event that the first die rolls the number i , for $i = 1, \dots, 6$. Define B_i and C_i similarly for the second and third dice, respectively.

Express each of the following events in terms of the events described above:

- (a) All three dice show even numbers
 - (b) No die shows an even number
 - (c) At least one die shows an odd number
 - (d) At most two dice show odd numbers
 - (e) The sum of the three die is no greater than 4
2. Prove DeMorgan's Law Part 2: For every two sets A and B , $(A \cap B)^c = A^c \cup B^c$.
There are multiple ways to prove this!
 3. Prove the following theorem: For every two sets A and B :
 - i) $A \cap B$ and $A \cap B^c$ are disjoint, and
 - ii) $A = (A \cap B) \cup (A \cap B^c)$

Then, in a single sentence/phrase, describe what this theorem says.

Friday 2/14

4. **Chapter 1:** 10
5. **Chapter 1:** 35
6. **Chapter 1:** 37

General rubric

Points	Criteria
5	The solution is correct <i>and</i> well-written. The author leaves no doubt as to why the solution is valid.
4.5	The solution is well-written, and is correct except for some minor arithmetic or calculation mistake.
4	The solution is technically correct, but author has omitted some key justification for why the solution is valid. Alternatively, the solution is well-written, but is missing a small, but essential component.
3	The solution is well-written, but either overlooks a significant component of the problem or makes a significant mistake. Alternatively, in a multi-part problem, a majority of the solutions are correct and well-written, but one part is missing or is significantly incorrect.
2	The solution is either correct but not adequately written, or it is adequately written but overlooks a significant component of the problem or makes a significant mistake.
1	The solution is rudimentary, but contains some relevant ideas. Alternatively, the solution briefly indicates the correct answer, but provides no further justification.
0	Either the solution is missing entirely, or the author makes no non-trivial progress toward a solution (i.e. just writes the statement of the problem and/or restates given information).
Notes:	For problems with multiple parts, the score represents a holistic review of the entire problem. Additionally, half-points may be used if the solution falls between two point values above.