MATH440 Homework Set 1

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Homework questions: 2.2.12, 2.2.16, 2.2.22,2.2.38 2.3.10, 2.3.12, 2.3.14

1 Chapter 2.2 Sample Spaces and the Algebra of Sets

Problem 2.2.12 Consider the experiment of choosing coefficients for the quadratic equation $ax^2 + bx + c = 0$. Characterize the values of a,b,and c associated with the event A: Equation has complex roots.

$$A = \{(a, b, c)|b^2 - 4ac < 0, a, b, c \in \mathbb{R}\}$$

Problem 2.2.16 Sketch the regions in the xy plane coresponding to $A \cup B$ and $A \cap B$ if:

$$A = \{(x, y)|0 < x < 3, 0 < y < 3\}$$
$$B = \{(x, y)|2 < x < 4, 2 < y < 4\}$$

Please see attached illustration for image of region(Still working on Tikz skills).

Problem 2.2.22 Suppose that each of the twelve letters in the word T E S S E L L A T I O N is written on a chip. Define the following events F,R and C as follows:

F: Letters in the first half of the alphabet
R: Letters that are repeated
V: Letters that are vowels
F={A,E,E,I,L,L}
R={T,T,L,L,E,E,S,S}
V={E,A,I,O,E}

a) What is F$\cap R \cap V$
$F \cap R = \{E, E\}$
$(F \cap R) \cap V = \{E, E\}$

b) What is $\mathrm{F}^C \cap R \cap V^C$
$F^C = \{N, O, S, S, T, T\}$
$V^C = \{S, S, T, T, N, L, L\}$
$R^C = \{I, O, N, A\}$

$F^C \cap R = \{S, S, T, T\}$
$(F^C \cap R) \cap V^C = \{S, S, T, T\}$

c) What is $\mathrm{F} \cap R^C \cap V$
$F \cap R^C = \{I, A\}$
$(F \cap R^C) \cap V = \{I, A\}$

Problem 2.2.38
Please see attached illustration figure 2.

Problem 2.3.10
An urn contains twenty-four chips, numbered 1 through 24. one is drawn at random. Let A be the event that the number is divisible by 2 and B be the event that the number is divisible by 3. Find $P(A \cup B)$