MATH 2710

1.5 - 2.3 Portfolio

Question 1:

a) Define the union of A and B, and the union of a family of sets $(A_i)_i$.

b) Define the intersection of A and B, and the intersection of a family of sets $(A_i)_i$.

c) Define the difference of A and B, and the symmetric difference of A and B.

d) State the distributive property of union with respect to intersection and the distributive property of intersection with respect to union.

Question 2:

a) Define the complementary of A with respect to a universal set U. Draw a picture of it.

b) State De Morgan relations and draw pictures that illustrate them.

c) Draw the complementary of the rectangle $[0, 2] \times [0, 4]$ in the plane, and intersect it with the disk centered at 0 and of radius 2.

Question 3:

a). Write the definition of a partition of a set U.

b). Give two examples of partitions of the set of real numbers - firstly a partition of R in two subsets, then a partition of R in an infinite number of subsets.

Question 4:

a). What is the difference between an open sentence and a statement?

b). Give two examples of open sentences and two examples of famous true statements in mathematics.

Question 5:

a) When is the statement $P \wedge Q$ true?

b) When is the statement $P \wedge Q$ false?

c) Give one example for each of the above two cases.

Question 6:

a) When is the statement $P \vee Q$ true?

b) When is the statement $P \vee Q$ false?

c) Give one example for each of the above two cases.

Question 7:

a) When is the statement Either P, or Q true?

b) When is the statement Either P, or Q false?

c) Give one example for each of the above two cases.

Question 8:

a). When is the statement $P \Rightarrow Q$ false?

b). Give an example in which $P \Rightarrow Q$ is false and explain why it is false.

c) What does it mean that P is a sufficient condition for Q?

d) What does it mean that Q is a necessary condition for P?

Question 9:

a). What is the hypothesis of the conditional statement $P \Rightarrow Q$?

b). What is the conclusion of the conditional statement $P \Rightarrow Q$?

c) What is the converse of the conditional statement $P \Rightarrow Q$?

d) Give one example of conditional statement such that the statement and its converse are both true; give one example of conditional statement such that the statement is true but the converse is false.