Queen Mary
University of London

SEF015: Discrete Mathematics (2022-23)

Material for the* Q&A session or…*Tutorial 2 (Week 3)

This material is for your tutorial in Week 3 and is designed to help your understanding. Please try to answer all the questions before you join your tutorial group.

Number of pages: 2

Question 1. Evaluate $f(x) = x^3 + 2x^2 - 5x - 6$ at $x = 2$. Use the result to factorise $f(x)$ into three linear factors.

Question 2. Write down the truth table for $\neg(\neg p \wedge q)$.

Question 3. Write down the truth table for $(p \wedge r) \vee (q \wedge r)$.

Question 4. Write down the truth table for $(p \vee \neg q) \leftrightarrow r$.

Question 5. Write down the truth table for $p \rightarrow (\neg r \vee q)$.

Question 6. Using truth tables, prove that the following statements are tautologies:

a) $\neg p \vee (p \vee q)$

b) $(p \rightarrow r) \rightarrow (p \rightarrow (q \vee r))$.

Question 7. Write down the negation, converse, inverse, and contrapositive of the implication p → q along with the corresponding truth tables.

Question 8. For each of the following implications write down (in words) the negation, converse, inverse and contrapositive. (Hint: First define the prepositions.)

(a) "If the grass is green, then it has rained in the last month".

(b) "(Let n be an integer.) If n is odd, then n 2 is odd".

(c) "(Let $\mathrm{P}(x)$ be a polynomial.) If $\mathrm{P}(a) = 0$ then $(x - a)$ divides P".