

SEF015: Discrete Mathematics (2022-23)

Material for the <u>Q&A session</u> or...Tutorial 1 (Week 2)

This material is for your tutorial in Week 2 and is designed to help your understanding. Please try to answer <u>all the questions</u> before you join your tutorial group.

Number of pages: 2

Question 1*. Compute the following polynomial in standard form (sum of terms which are arranged in descending order from largest to lowest power of x)

$$(1 + x^3 + x^5)(1 - x^3 - x^5).$$

Question 2*. Write the following polynomial in summation form:

i) $x + 2x^2 + 3x^3 + 4x^4 + \dots + 100x^{100}$, *ii*) $5 + 10x + 15x^2 + 20x^3 + 25x^4$.

Question 3*. Expand the following polynomial and write it in standard form:

$$\left(\sum_{i=0}^{2}a_{i}x^{i}\right)\left(\sum_{j=0}^{3}b_{j}x^{j}\right).$$

Question 4. Write the following in product notation:

$$(x - 1)(x^2 - 2)(x^3 - 3)(x^4 - 4).$$

Question 5*. Divide $8x^6 - 6x^4 + 8x^3 - 7x + 2$ by $2x^3 + x + 1$, finding the quotient q(x) and remainder r(x). Verify that the quotient times $2x^3 + x + 1$ plus the remainder is the original polynomial.

Question 6. Divide $x^3 - 7x^2 + 8x + 16$ by x - 4.

Question 7. Can you name the following properties for real numbers a, b and c?

i) a + b = b + a

$$ii) (a + b) + c = a + (b + c)$$

Question 8. Please show the following properties for integers a, b:

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i) a0 = 0
ii) a(-b) = -(ab)
iii) a(-1) = -a
iv) (-a)(-b) = ab
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$$v$$
) $ab = 0 \implies a = 0 \text{ or } b = 0$