



**Preparatory Course for
Mathematical Methods in Economics and Business**

5. Exercise Sheet

Exercise 1 (Complex Numbers I)

Calculate:

a) $(4 + 2i) + (5 - i)$ b) $(3 + 5i)(2 - i)$ c) $\overline{(321 - 12i)}$

Exercise 2 (Complex Numbers II)

Simplify to the algebraic form $(a + ib)$:

a) $z = i^6 + i^3 + 2$ b) $w = \frac{i - 2}{3i + 6}$

Exercise 3 (Complex Numbers III)

Calculate the absolute value and the complex conjugate:

a) $w = i^{17}$ b) $z = (1 + i)^6$

Exercise 4 (Combinatorics)

A birthday party is attended by 12 guests. Alice and Bob are among them.

- How many possibilities exist for 2 guests to toast with their champagne glass?
- After raising their glasses, the guests perform a polonaise. How many arrangement possibilities exist if the polonaise is danced in a line?
- How many arrangement possibilities are there if there are just 2 people between Alice and Bob and the polonaise is danced in a line?
- The polonaise is closed to form a circle. How many arrangement possibilities are there now?