# Problem statement:

A math teacher needs a program that will help students test different properties of complex numbers, provided in the a+bi form (assume a, b integers for simplicity). The program manages a list of complex numbers and allows its user to repeatedly execute the following functionalities (each functionality is exemplified):

Feature list:

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| --- |
| 1. **add <number>** – add a new complex number to the list |
| 1. **insert <number>** at position - add a new complex number to a certain position in the list |
| 1. **remove <position>** - remove a complex number from the list (giving the position) |
| 1. **remove <start position> to <end position**> - remove a range of complex number from the list |
| 1. **replace <old number> with <new number>** - replace a complex number with a new one |
| 1. **list** – Shows the list of complex number |
| 1. **list real <start position> to <end position>** - writes the real numbers (imaginary part =0) between positions 1 and 5 in the list. |
| 1. **list modulo [ < | = | > ] <number>** - writes all numbers having modulo [ < | = | > ] than the number written |
| 1. **sum <start position> to <end position>** - writes the sum of the numbers between positions <start position> and <end position> in the list |
| 1. **product <start position> to <end position>** - writes the product of the numbers between positions <start position> and <end position> in the list |
| 1. **Filter real -** keep only real numbers (imaginary part =0) in the list |
| 1. **filter modulo [ < | = > ] <number> -** keep only those numbers having modulo [ < | = | > ] in the list |
| 1. **undo** – the last operation that has modified program data will be reversed. The user has to be able to undo all operations performed since program start by repeatedly calling this function. |

Iteration plan:

|  |  |
| --- | --- |
| **It.1** | Features 1 – 5 |
| **It.2** | Features 6 - 10 |
| **It.3** | Features 11 - 13 |

Running scenario

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | User | Program |
| a |  |  | Shows menu |
| b |  | add 1+1i |  |
| c |  | add 2+2i |  |
| d |  | list |  |
| e |  |  | 1 + 1i, 2 + 2i |
| f |  | add 3+2i at 0 |  |
| g |  |  | 3 + 2i, 1 + 1i, 2 + 2i |
| h |  | replace 1+1i with 9+9i |  |
| i |  | list real 0 to 2 |  |
| j |  |  | 3, 9 |
| k |  | list |  |
| l |  |  | 3 + 2i, 9 + 9i, 2 + 2i |
| m |  | sum 0 to 2 |  |
| n |  |  | 12 + 11i |
| o |  | add 7+3i |  |
| p |  | product 1 to 3 |  |
| q |  |  | 18 + 18i |
| r |  | List modulo = 12 |  |
| s |  |  | 9 + 9i |
| t |  | list real 0 to 3 |  |
| u |  |  | 3, 9, 2 |

Work items/tasks

|  |  |
| --- | --- |
| T1 | Adding, removing and replaces complex numbers in the list |
| T2 | Show the list, all the real parts of the complex number and just the complex number that has modulo greater than, lower than or equal to a number |
| T3 | Filter the list to keep only the real numbers or to keep the complex numbers that have modulo greater than, lower than or equal to a number.  Undo the operations |