CodeCrunch

CS1010E Practice Exercise: Complex Numbers

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Complex Numbers

A complex number takes the form `a + bi` where `a` is the real part, `b` is the imaginary part and `i = √(-1)`.

The arithmetic operations over complex numbers are defined below:

- Addition: `(a + bi) + (c + di) = (a + c) + (b + d)i`
- Subtraction: `(a + bi) - (c + di) = (a - c) + (b - d)i`
- Multiplication: `(a + bi)(c + di) = (ac - bd) + (bc + ad)i`

Write a program that reads a series of instructions and performs the required complex number operations using a single register. Each line of input is in one of the following forms:

`create a b`
Creates a complex number `(a + bi)` and place in the register; any previous register value is overwritten

`add a b`
Add complex number `(a + bi)` to the existing one in the register; result overwrites the register

`sub a b`
Subtract complex number `(a + bi)` from the existing one in the register; result overwrites the register

`mul a b`
Multiply complex number `(a + bi)` to the existing one in the register; result overwrites the register

`print`
Prints the complex number in the register

`end`
End the program

Sample Runs

The following are sample runs of the program. User input is underlined. Ensure that the last line of output is followed by a newline character.

- Sample run #1:

```
create 4 5
print
add 4 5
print
sub 4 5
print
mul 4 5
print
end
```

```
4+5i
8+10i
4+5i
-9+40i
```

- Sample run #2:

```
create 4 5
add 1 2
sub 3 4
mul 5 6
print
end
-8+27i
```

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