Forritunarmál Einstaklingsverkefni 9

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```
{;;;

Design document for "complex.mmod"
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Exported
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Use:  z = complex(x,y);
Pre:  x and y are floating point numbers.
Post: z is the complex number x+yi.

Use:  x = real(z);
Pre:  z is a complex number.
Post: x is the real part of z.

Use:  x = imag(z);
Pre:  z is a complex number.
Post: x is the imaginary part of z.

Use:  z = x+++y;
Pre:  x and y are complex numbers.
Post: z is a complex number that is the sum of x and y.

Use:  z = x---y;
Pre:  x and y are complex numbers.
Post: z is a complex number that is the difference of x and y.

Use:  z = x***y;
Pre:  x and y are complex numbers.
Post: z is a complex number that is the product of x and y.

Use:  z = x///y;
Pre:  x and y are complex numbers.
      y is not zero.
Post: z is a complex number that is the quotient of x and y.

Imported
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Only BASIS function are imported.

;;;}

"complex.mmod" =
```

```
!{{
;;; Data invariant:
;;;   A complex number z = x+yi, where x and y
;;;   are double numbers, is represented as the pair [x$y].

+++ =
    fun(x,y)
    {
        return complex(real(x) + real(y), imag(x) + imag(y));
    };

--- =
    fun(x,y)
    {
        return complex(real(x) - real(y), imag(x) - imag(y));
    };

*** =
    fun(x,y)
    {
        var xr = real(x);
        var xi = imag(x);
        var yr = real(y);
        var yi = imag(y);
        return complex(xr * yr - xi * yi, xr * yi + xi * yr);
    };


/// =
    fun(x,y)
    {
        var xr = real(x);
        var xi = imag(x);
        var yr = real(y);
        var yi = imag(y);
        val d = yr * yr + yi * yi;
        return complex((xr * yr + xi * yi)/d, (xi * yr - xr * yi)/d);
    };

complex =
    fun(x,y)
    {
        return [x$y];
    };
```

```
real =
    fun(z)
    {
        return head(z);
    };

imag =
    fun(z)
    {
        return tail(z);
    };
}}
;
```

```
ragnar@gamer ~/school/forritun/v9 ◆ java -jar morpho.jar testcomplex
(1+0i)+(0+2i)=1.0+2.0*i
(1+i)+(3+4i)=4.0+5.0*i
(1+0i)-(0+i)=1.0+-1.0*i
(2+3i)-(4+5i)=-2.0+-2.0*i
(0+i)*(0+i)=-1.0+0.0*i
(1-i)*(1+i)=2.0+0.0*i
(1+i)*(2+3i)=-1.0+5.0*i
(2+0i)/(1+i)=1.0+-1.0*i
(-1+0i)/(0+i)=0.0+1.0*i
ragnar@gamer ~/school/forritun/v9 ◆
```