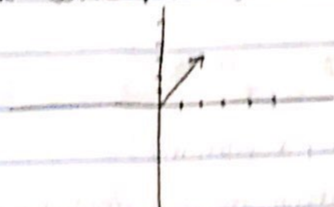


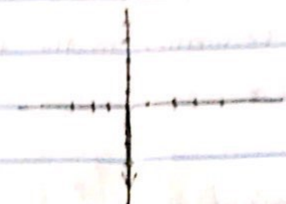
## Homework 4: Fields

1. Compute and draw the corresponding vectors for the following:

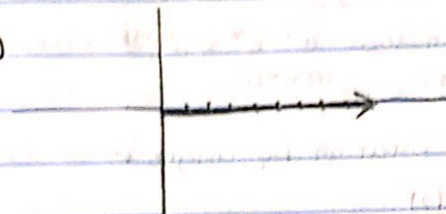
a)  $(5+2i) + (-3+1i)$   
 $(2+3i)$



b)  $(-1+3i) + (1-7i)$   
 $(0-4i)$   
 $(0-4i)$



c)  $(5-0.01i) + (4+0.01i)$   
 $(9+0i)$



2. Use the first rule of exponentiation to express the product of two exponentials as a single exponential

a)  $e^{2i} e^{3i}$   
 $e^{2i+3i}$   
 $e^{5i}$

b)  $e^{\frac{\pi}{4}i} e^{\frac{\pi}{3}i}$   
 $e^{\frac{3\pi}{12}i} e^{\frac{4\pi}{12}i}$   
 $e^{\frac{3\pi+4\pi}{12}i}$   
 $e^{\frac{7\pi}{12}i}$

c)  $e^{-\frac{\pi}{3}i} e^{\frac{\pi}{2}i}$   
 $e^{-\frac{2\pi}{6}i} e^{\frac{3\pi}{6}i}$   
 $e^{-\frac{2\pi}{6}i + \frac{3\pi}{6}i}$   
 $e^{\frac{-2\pi+3\pi}{6}i}$   
 $e^{\frac{\pi}{6}i}$



### Homework 4: Fields

3 Show that  $GF(2)$  is a field.

#### Closure

$x+y$	$x*y$
$0+0=0$	$0*0=0$
$0+1=1$	$0*1=0$
$1+0=1$	$1*0=0$
$1+1=2$	$1*1=1$

#### Commutativity

$x+y = y+x$	$x*y = y*x$
$0+0=0+0$	$0*0=0*0$
$0+1=1+0$	$0*1=1*0$
$1+0=0+1$	$1*0=0*1$
$1+1=1+1$	$1*1=1*1$

#### Associativity

$(x+y)+z = x+(y+z)$	$(x*y)*z = x*(y*z)$
$(0+0)+0 = 0+(0+0)$	$(0*0)*0 = 0*(0*0)$
$(0+0)+1 = 0+(0+1)$	$(0*0)*1 = 0*(0*1)$
$(0+1)+0 = 0+(1+0)$	$(0*1)*0 = 0*(1*0)$
$(0+1)+1 = 0+(1+1)$	$(0*1)*1 = 0*(1*1)$
$(1+0)+0 = 1+(0+0)$	$(1*0)*0 = 1*(0*0)$
$(1+0)+1 = 1+(0+1)$	$(1*0)*1 = 1*(0*1)$
$(1+1)+0 = 1+(1+0)$	$(1*1)*0 = 1*(1*0)$
$(1+1)+1 = 1+(1+1)$	$(1*1)*1 = 1*(1*1)$

#### Distributivity

$z(x+y) = zx+zy$
$0(0+0) = 0*0+0*0$
$1(0+0) = 1*0+1*0$
$0(0+1) = 0*0+0*1$
$1(0+1) = 1*0+1*1$
$0(1+0) = 0*1+0*0$
$1(1+0) = 1*1+1*0$
$0(1+1) = 0*1+0*1$

#### Distributivity

$$1(1+1) = 1*1+1*1$$

#### Identity Element

$x+1 = x$	$x*1 = x$
$x+0 = x$	$x*1 = x$
$0+0 = 0$	$0*1 = 0$
$1+0 = 1$	$1*1 = 1$

#### Inverse Element

$x+x = 1$	$x*x = 1$
$x+(-x) = 0$	$x*\frac{1}{x} = 1$
$0+(-0) = 0$	$1*\frac{1}{1} = 1$
$0+(0) = 0$	$0*(0) = 0$