PRACTICAL 1

DECLARING A COMPLEX NUMBER AND ITS GRAPHICAL REPRESENTATION

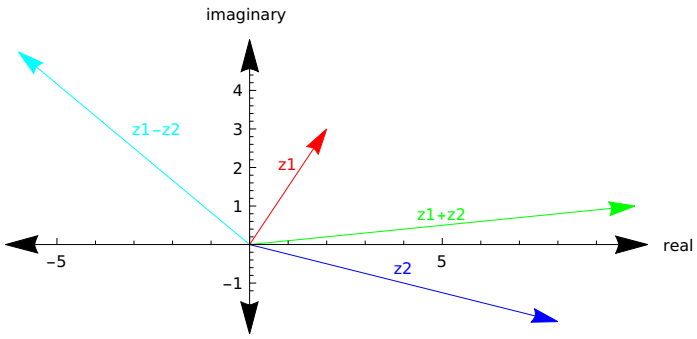
Ques 1. z1 = 2+3 I and z2 = 8-2I

In[92]:=
```
z1 = 2 + 3 I
z2 = 8 - 2 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1] / 2, 0.7 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.05, 0.05}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2] / 2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2] / 2, 0.8 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[
 z1plot,
 z2plot,
 a,
 b]
```

Out[92]= $2 + 3\,i$

Out[93]= $8 - 2\,i$

Out[98]=



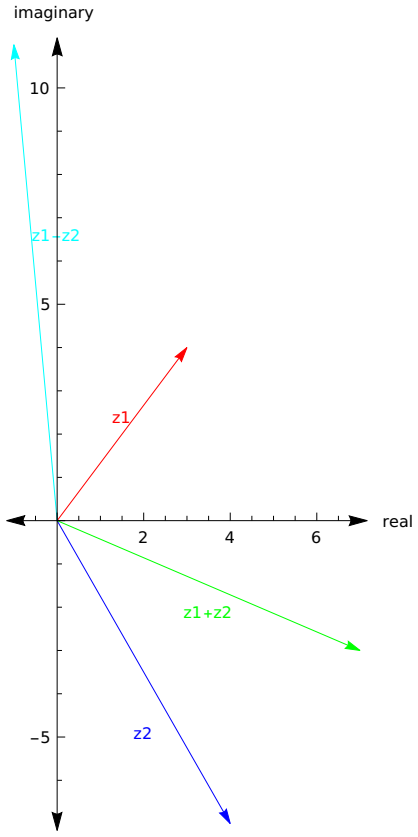
Ques 2. z1 = 3+4 I and z2 = 4-7 I

In[141]:=
```
z1 = 3 + 4 I
z2 = 4 - 7 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1] / 2, 0.6 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.05, 0.05}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2] / 2, 0.7 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2] / 2, 0.7 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.005 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[141]= $3 + 4\,i$

Out[142]= $4 - 7\,i$

Out[147]=



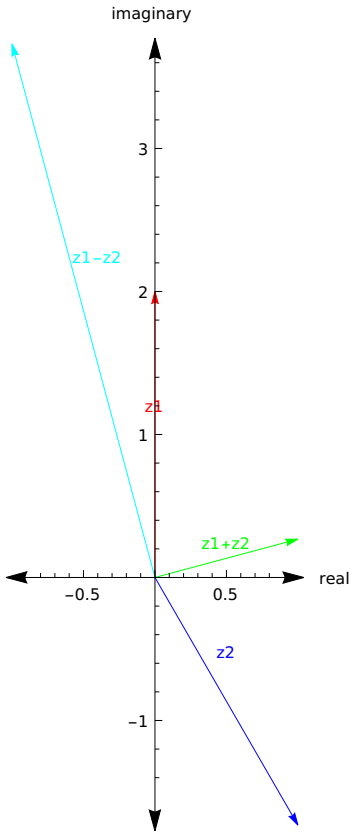
Ques 3. z1 = 2 I and z2 = 1-$\sqrt{3}$ I

In[204]:=
```
z1 = 2 I
z2 = 1 - √3 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1] / 2, 0.6 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.07, 0.07}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2] / 2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2] / 2, 0.9 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[204]= $2\,i$

Out[205]= $1 - i\,\sqrt{3}$

Out[210]=



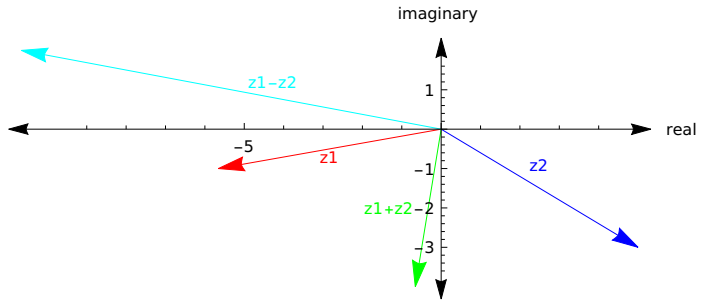
Ques 4. z1 = -4 √2-I and z2 = 5-3 I

In[246]:=
```
z1 = -4 × √2 - I
z2 = 5 - 3 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1]/2, 0.7 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.03, 0.03}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2]/2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {2 Re[z1 + z2], 0.5 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[246]= $-i - 4\sqrt{2}$

Out[247]= $5 - 3i$

Out[252]=



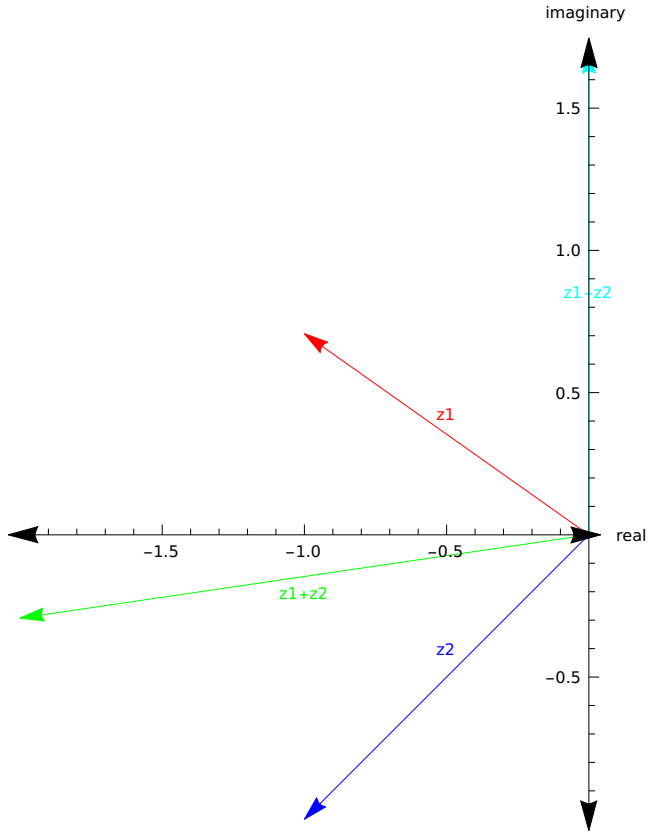
Ques 5. z1 = -1+(1/$\sqrt{2}$) I and z2 = -1- I

In[274]:=
```
z1 = -1 + (1 / √2) I
z2 = -1 - I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1] / 2, 0.6 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.05, 0.05}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2] / 2, 0.4 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2] / 2, 0.7 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {2 Re[z1 - z2], 0.5 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[274]=
$$-1 + \frac{i}{\sqrt{2}}$$

Out[275]=
$$-1 - i$$

Out[280]=



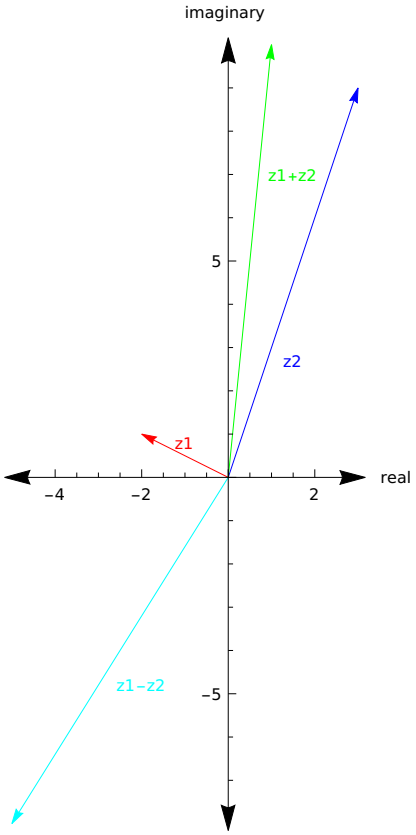
Ques 6. z1 = -2+I and z2 = 3+9 I

In[288]:=
```
z1 = -2 + I
z2 = 3 + 9 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1]/2, 0.8 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.07, 0.07}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2]/2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {1.5 Re[z1 + z2], 0.7 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[288]= $-2 + i$

Out[289]= $3 + 9\,i$

Out[294]=



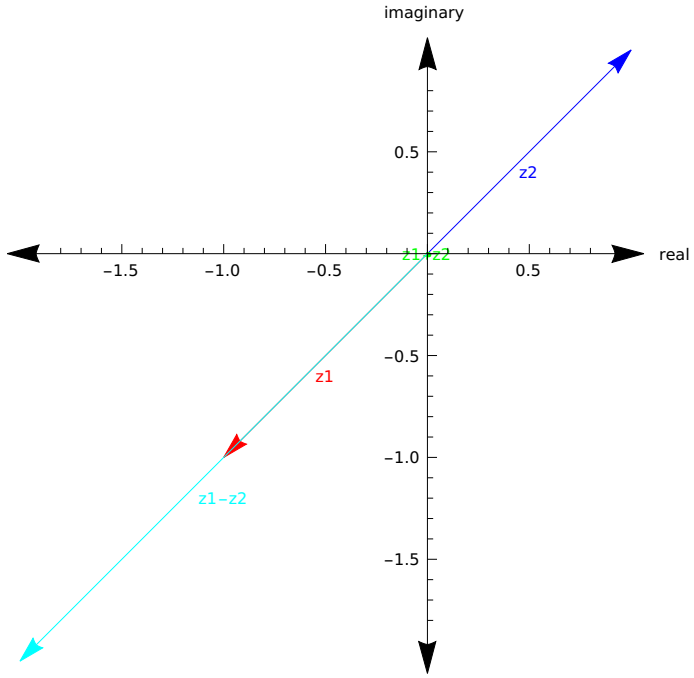
Ques 7. z1 = -1- I and z2 = 1+I

In[295]:=
```
z1 = -1 - I
z2 = 1 + I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1]/2, 0.6 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.05, 0.05}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2]/2, 0.4 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2]/2, 0.7 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.5 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[295]= $-1-i$

Out[296]= $1+i$

Out[301]=



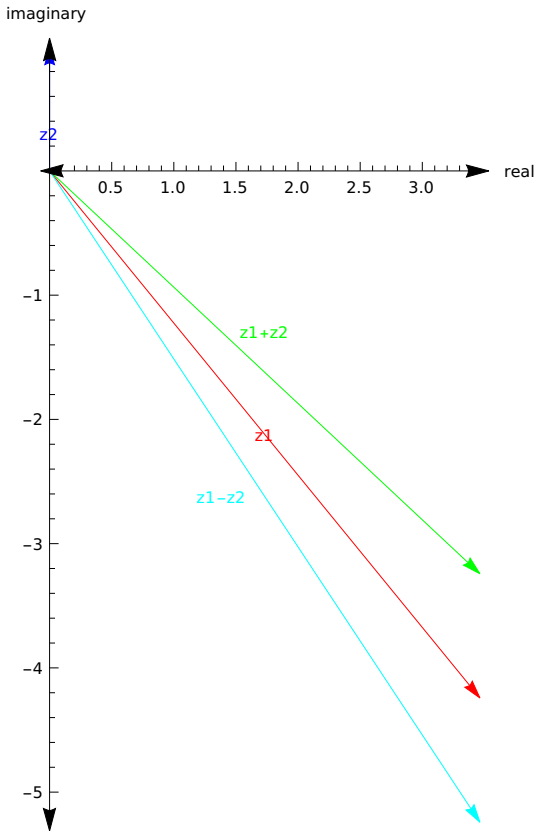
Ques 8. z1 = 2√3-3√2 I and z2 = I

In[323]:=
```
z1 = 2 × √3 - 3 × √2 I
z2 = I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1]/2, 0.5 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.05, 0.05}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2]/2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2]/2, 0.4 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.5 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[323]= $-3\,i\,\sqrt{2}+2\,\sqrt{3}$

Out[324]= i

Out[329]=



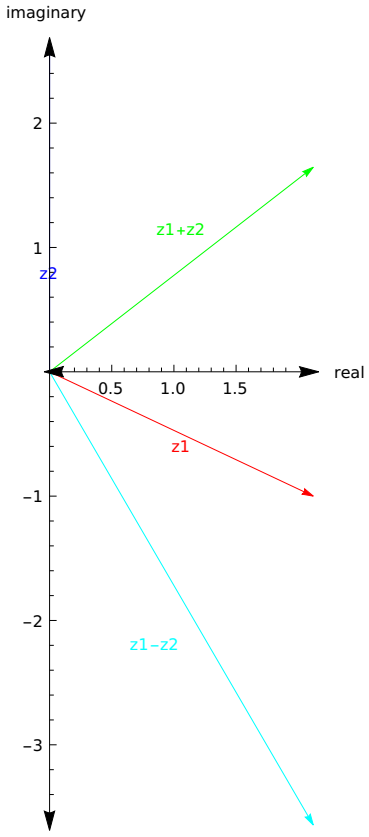
Ques 9. z1 = $\sqrt{2}$+(1/$\sqrt{2}$) - I and z2 = $\sqrt{7}$ I

In[337]:=
```
z1 = √2 + (1 / √2) - I
z2 = √7 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1]/2, 0.6 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.07, 0.07}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2]/2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2]/2, 0.7 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[337]=
$$-i + \frac{1}{\sqrt{2}} + \sqrt{2}$$

Out[338]=
$$i\sqrt{7}$$

Out[343]=



Ques 10. z1 = 4 I and z2 = 5+0 I

In[351]:=
```
z1 = 4 I
z2 = 5 + 0 I
z1plot = Graphics[{Red, Arrow[{{0, 0}, {Re[z1], Im[z1]}}], Text["z1", {Re[z1] / 2, 0.6 Im[z1]}]},
   Axes → True, AxesStyle → Arrowheads[{-0.03, 0.03}], AxesLabel → {real, imaginary}];
z2plot = Graphics[{Blue, Arrow[{{0, 0}, {Re[z2], Im[z2]}}],
    Text["z2", {Re[z2] / 2, 0.3 Im[z2]}]}, Axes → True];
a = Graphics[{Green, Arrow[{{0, 0}, {Re[z1 + z2], Im[z1 + z2]}}],
    Text["z1+z2", {Re[z1 + z2] / 2, 0.7 Im[z1 + z2]}]}, Axes → True];
b = Graphics[{Cyan, Arrow[{{0, 0}, {Re[z1 - z2], Im[z1 - z2]}}],
    Text["z1-z2", {0.4 Re[z1 - z2], 0.6 Im[z1 - z2]}]}, Axes → True];
Show[z1plot, z2plot, a, b]
```

Out[351]= $4\,i$

Out[352]= 5

Out[357]=