Figure (dualityInR3Fig1.eps) showing the R3 dual plane to a vector graphically. The scaling of the dual plane was only for illustration purposes and did not match the length of the vector.

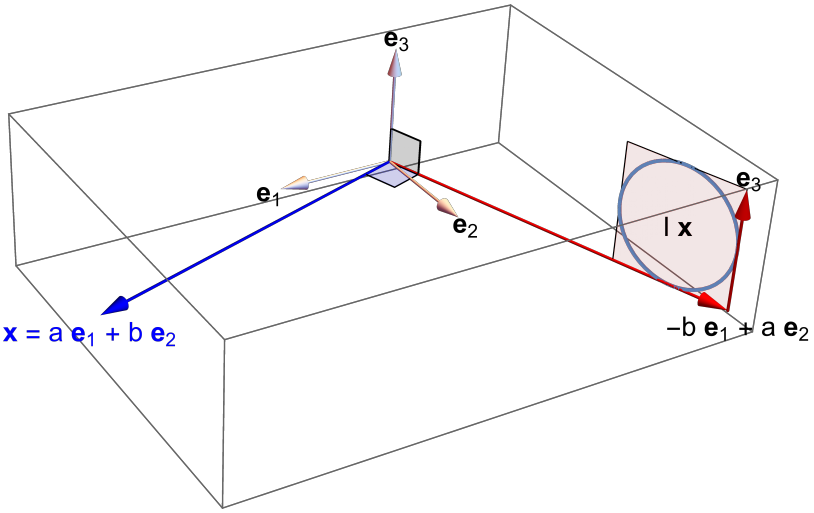
```
<< peeters`

(*relative to ~/physicsplay*)
peeters`setGitDir[ "../project/figures/GAelectrodynamics" ]
```

```
peeters`
```

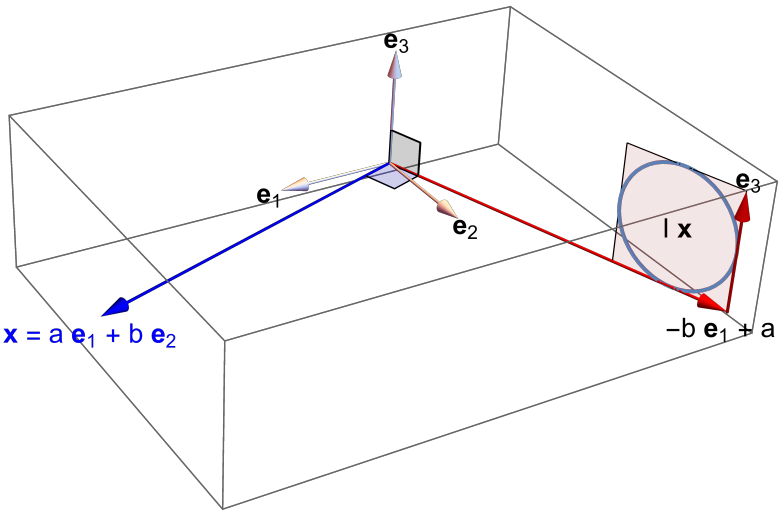
```
/Users/pjoot/project/figures/GAelectrodynamics
```

```
ClearAll[a, b, x, xp, e1, e2, e3, o]

a = 3;
b = 1;
{e1, e2, e3} = IdentityMatrix[3];
o = {0, 0, 0};
x = {a, b, 0};
xp = {-b, a, 0};

ClearAll[ fs, esub, bold]
fs = Style[#, FontSize → 14] &;
bold = Style[#, Bold] &;
esub = fs[Subscript[ "e" // bold , #]] &;
(*rcaptxt = OverHat["r" ] // bold // fs;
tcaptxt = OverHat["θ" ] // bold // fs;*)

Show[{
  Graphics3D[{
    Arrow[Tube[{o, e1}]],
    Arrow[Tube[{o, e2}]],
    Arrow[Tube[{o, e3}]],
    Text[esub[1], 1.1 e1],
    Text[esub[2] , 1.1 e2],
    Text[esub[3], 1.1 e3],
    Blue,
    Arrow[Tube[{o, x}]],
    Red,
    Arrow[Tube[{o, xp}]],
    Arrow[Tube[{xp, xp + e3}]],
    Blue,
    Text[Row[{"x" // bold // fs, " = a " // fs,
       esub[1], " + b " // fs, esub[2]}], x + 0.1 (Normalize[x] - e3)],
    Black,
    Text[esub[3] // fs, xp + 1.1 e3],
```

```
    Text[Row[{"-b " // fs, esub[1], " + a " // fs, esub[2]}],
     xp + 0.1 (Normalize[xp] - e3)],
    Black,
    Text[Row[{"I " // fs, "x" // bold // fs}], xp + (- Normalize[xp] + e3) / 2],
    Opacity[0.1],
    Parallelepiped[ o, 0.3 {(xp // Normalize) , e3,  x / 100}],
    Blue,
    Parallelepiped[ o, 0.3 {(x // Normalize) , (xp // Normalize),  e3 / 100}],
    Red,
    Parallelepiped[ xp, {-Normalize[xp], e3}],

   }],
  ParametricPlot3D[
   xp + (- Normalize[xp] + e3 + e3 Cos[t] + Normalize[xp] Sin[t]) / 2, {t, 0, 2 Pi}]
}]
```



p =



;

```
peeters`exportForLatex["dualityInR3Fig1", p]
```

```
{dualityInR3Fig1.eps, dualityInR3Fig1pn.png}
```