Vector addition and vector (and scalar) sign figures: VectorsWithOppositeOrientationFig1.eps, vectorAdditionFig1.eps, scalarOrientationFig1.eps

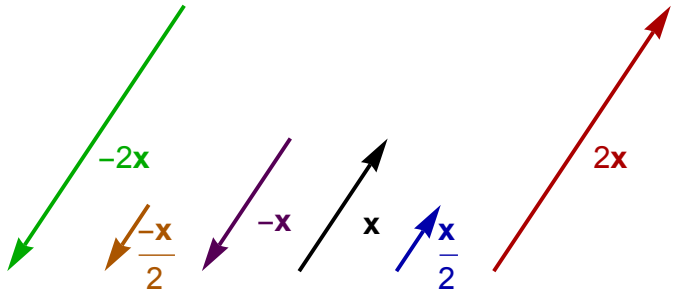
```
<< peeters` ;
peeters`setGitDir[ "../project/figures/GAelectrodynamics" ]
```

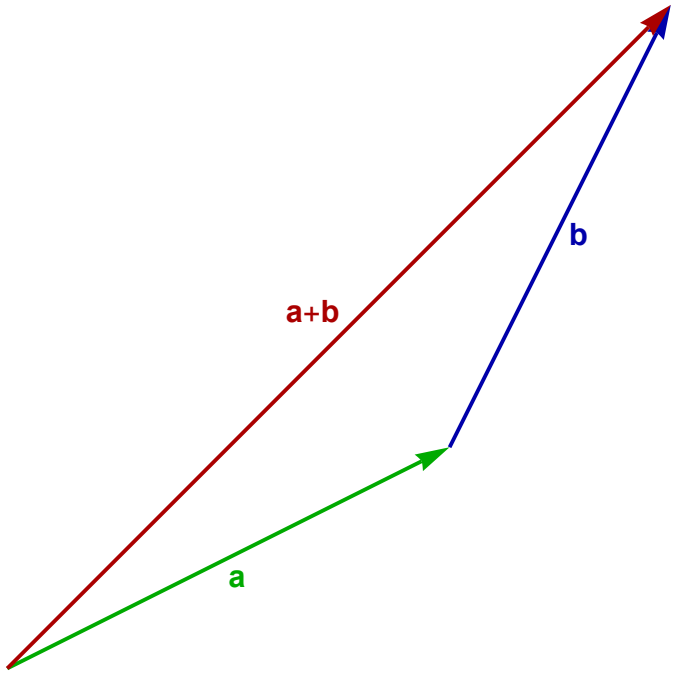
```
/Users/pjoot/project/figures/GAelectrodynamics
```

```
ClearAll[e1, e2, bold, fs, o]

bold = Style[ #, Bold] &;
fs := Style[ #, FontSize → 16 ] &;

(*{e1,e2,e3}= IdentityMatrix[3];*)
{e1, e2} = IdentityMatrix[2];
o = {0, 0};

ClearAll[clk, ctr, rp, rn]
ctr = RotationTransform[Pi / 2];
clk = RotationTransform[-Pi / 2];
rp = ctr[# // Normalize] &;
rn = clk[# // Normalize] &;


p4 = Module[{x0, x1, h0, h1, d0, d1, n0, n1, nh0, nh1, hd0, nd1, s, of},
  x0 = o;
  of = 0.8;
  s = 2.2 e1;
  x1 = 2 (e1 + 1.5 e2);
(*half*)
  h0 = x0 + s;
h1 = x1 / 2 + s;
(*double*)
  d0 = x0 + 2 s;
d1 = 2 x1 + 2 s;
(*negated*)
  n0 = x1 - s;
n1 = x0 - s;
(*half negated*)
```

```
  nh0 = x1 / 2 - 2 s;
nh1 = x0 - 2 s;
(*double negated*)
  nd0 = 2 x1 - 3 s;
nd1 = x0 - 3 s;
  Graphics[{
    Thick,
    Arrowheads[0.05],
    Black, Arrow[{x0, x1}],
    Text["x" // bold // fs, (x0 + x1) / 2 - of rp[x1 - x0]],
    Blue // Darker, Arrow[{h0, h1}],
    Text[ "x" // bold // fs / "2" // fs, (h0 + h1) / 2 - of rp[h1 - h0]],
    Red // Darker, Arrow[{d0, d1}],
    Text[Row[{"2" // fs, "x" // bold // fs}], (d0 + d1) / 2 - of rp[d1 - d0]],
    Purple // Darker, Arrow[{n0, n1}],
    Text[Row[{"-" // fs, "x" // bold // fs}], (n0 + n1) / 2 + of rp[n1 - n0]],
    Orange // Darker, Arrow[{nh0, nh1}],
    Text[ Row[{"-" // fs, "x" // bold // fs}] / "2" // fs, (nh0 + nh1) / 2 + of rp[nh1 - nh0]],
    Green // Darker, Arrow[{nd0, nd1}],
    Text[Row[{"-2" // fs, "x" // bold // fs}], (nd0 + nd1) / 2 + of rp[nd1 - nd0]]
   }]]


p2 = Module[{v1, v2, vs},
  v1 = e1 + 0.5 e2;
  v2 = 0.5 e1 + e2;
  vs = v1 + v2;

  Graphics[ {
    Thick,
    Arrowheads[0.05],
    Green // Darker,
    Arrow[{o, v1}],
    Text["a" // bold // fs, v1 / 2 + 0.05 rn[v1] ],
    Blue // Darker,
    Arrow[{v1, vs} ],
    Text["b" // bold // fs, v1 + v2 / 2 + 0.05 rn[v2]],
    Red // Darker,
    Arrow[{o, vs} ],
    Text[Row[{
       "a" // bold // fs,
```

```
      "+" // fs,
      "b" // bold // fs}]
    , vs / 2 + 0.08 rp[vs]]
  }]
]
```





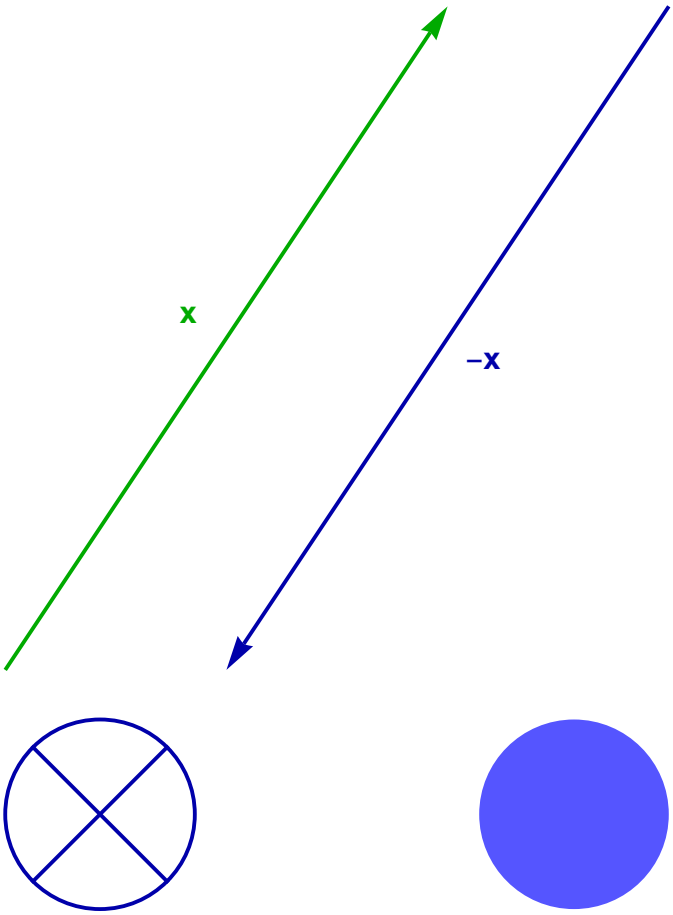

```
peeters`exportForLatex["VectorsWithOppositeOrientationFig1", p4] (* was p1 *)
peeters`exportForLatex["vectorAdditionFig1", p2]
```

{VectorsWithOppositeOrientationFig1.eps, VectorsWithOppositeOrientationFig1pn.png}

{vectorAdditionFig1.eps, vectorAdditionFig1pn.png}

```
p1 = Module[{x0, x1, y0, y1},
  x0 = o;
  x1 = e1 + 1.5 e2;
  y0 = 1.5 e1 + 1.5 e2;
  y1 = e1 / 2;
  Graphics[ {
    Thick,
    Arrowheads[0.05],
    Green // Darker,
    Arrow[{x0, x1}],
    Text["x" // bold // fs,  (x0 + x1) / 2 + 0.1 rp[x1 - x0]],
    Blue // Darker,
    Arrow[{y0, y1} ],
    Text[Row[{"-" // fs, "x" // bold // fs}],  (y0 + y1) / 2 + 0.1 rp[y1 - y0]]
   }]
 ]
```

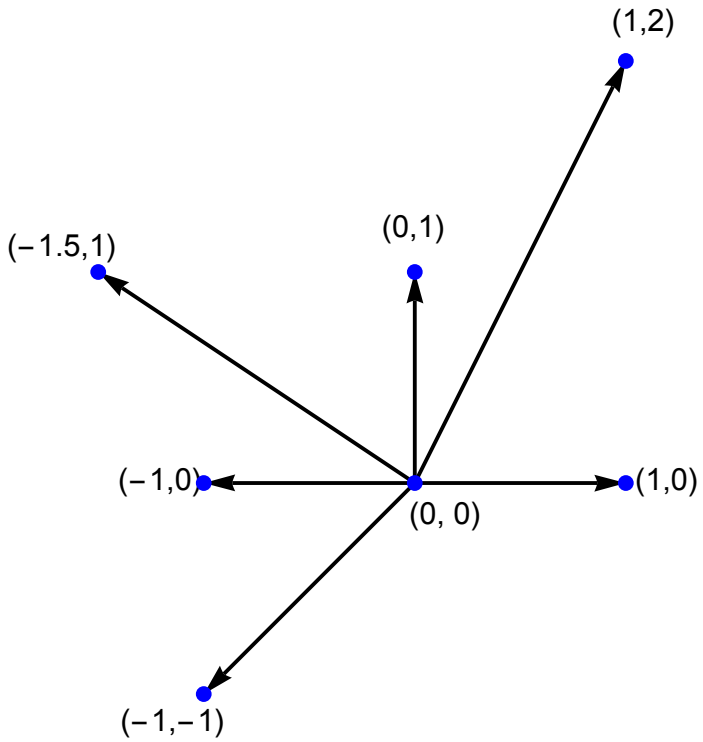
```
p3 = Module[{p1, p2, r},
  r = 0.01;
  p1 = r (e1 + e2) / Sqrt[2];
  p2 = r (e1 - e2) / Sqrt[2];
  Graphics[ {
    Thick,
    Blue // Darker,
    Circle[o, r],

    Line[{-p1, p1}],
    Line[{-p2, p2}],
    Blue // Lighter,
    Disk[0.05 e1, r]
   }]
 ]
```




```
peeters`exportForLatex["scalarOrientationFig1", p3]
```

In[498]:=
```
p5 = Module[{x},
  x = {{1, 0}, {1, 2}, {0, 1}, {-1.5, 1}, {-1, -1}, {-1, 0}};
  {
     {
      Thick,
      Arrowheads[0.05]
     }
     , Arrow[{o, #}] & /@ x
     , Text[Row[fs[#] & /@ {"(", #[[1]], ",", #[[2]], ")"}],
        # + 0.2 Normalize[#]] & /@ x
     , Blue
     , PointSize → 0.025
     , Point[#] & /@ x
     , Point[o]
     , Black
     , Text[Row[fs[#] & /@ {"(0, 0)"}], 0.15 {1, -1}]
    } // Flatten // Graphics

 ]
```

Out[498]=



In[499]:=
```
peeters`exportForLatex["coordinateRepresentationFig1", p5]
```

Out[499]= {coordinateRepresentationFig1.eps, coordinateRepresentationFig1pn.png}