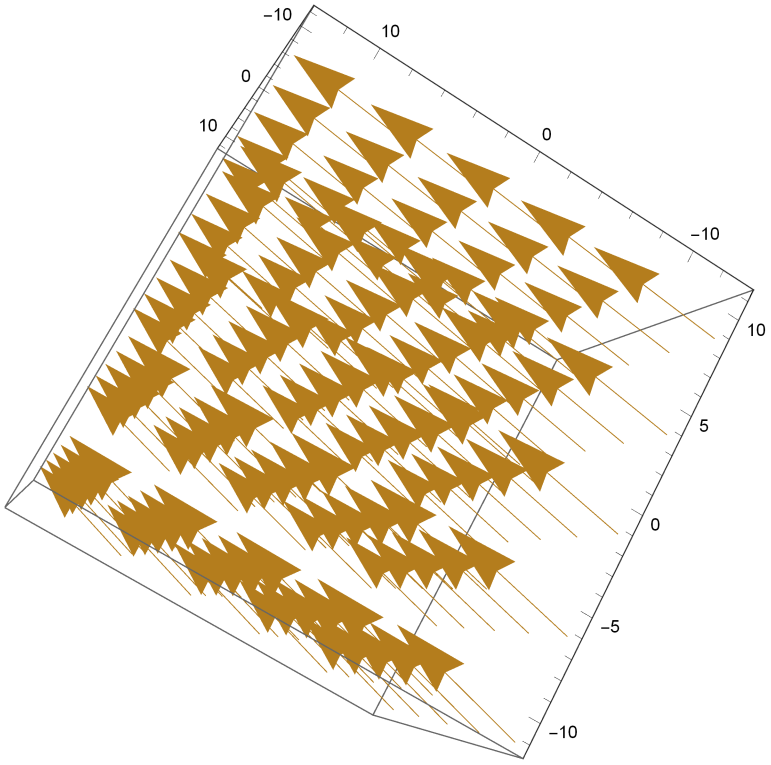
Problem Set 1.1

Exer 1 - a.

```
points = {{0, 0, 0}}
```

In[15]:=
```
VectorPlot3D[{{1, 2, 3}, {3, 6, 9}}, {x, -10, 10},
 {y, -10, 10}, {z, -10, 10}, PlotRange → All, VectorPoints → 5]
```

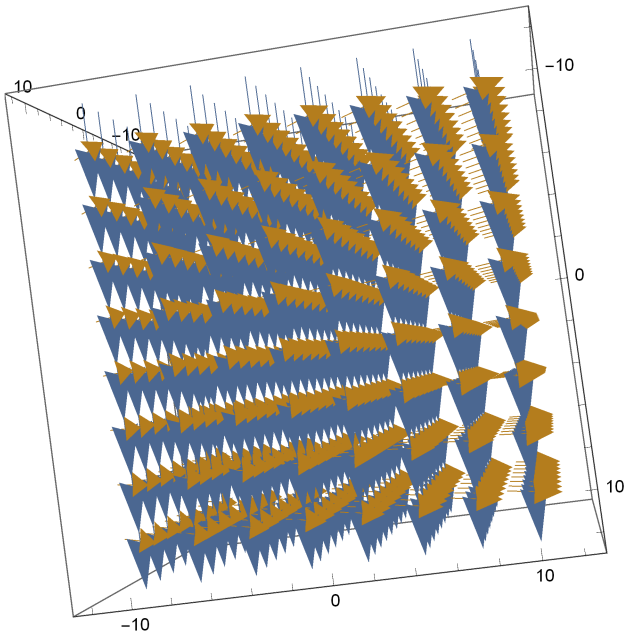
Out[15]=



Ex. 1 - b.

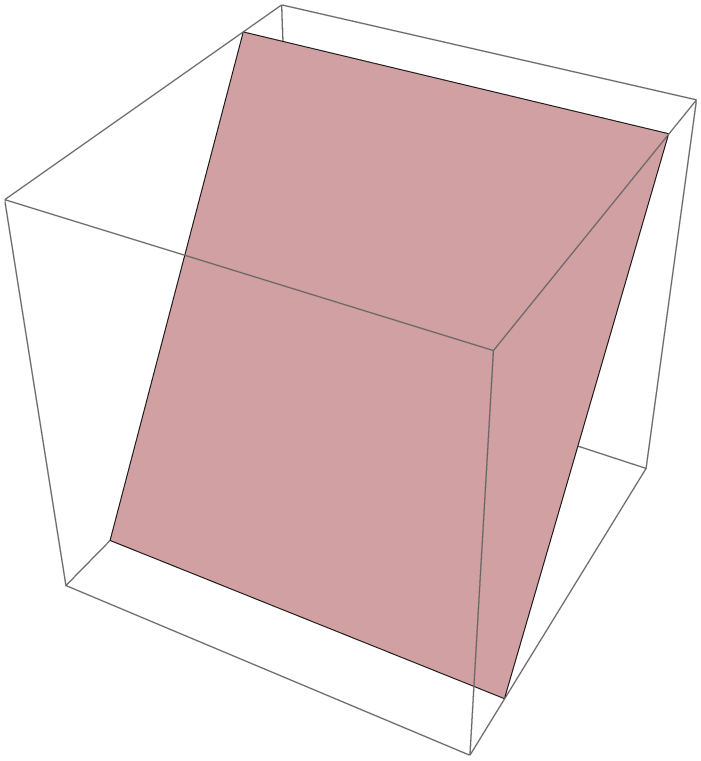
In[18]:=
```
VectorPlot3D[{{1, 0, 0}, {0, 2, 3}}, {x, -10, 10}, {y, -10, 10}, {z, -10, 10}]
```

Out[18]=



In[37]:=
```
Graphics3D[InfinitePlane[{0, 0, 0}, {{1, 0, 0}, {0, 2, 3}}]]
```

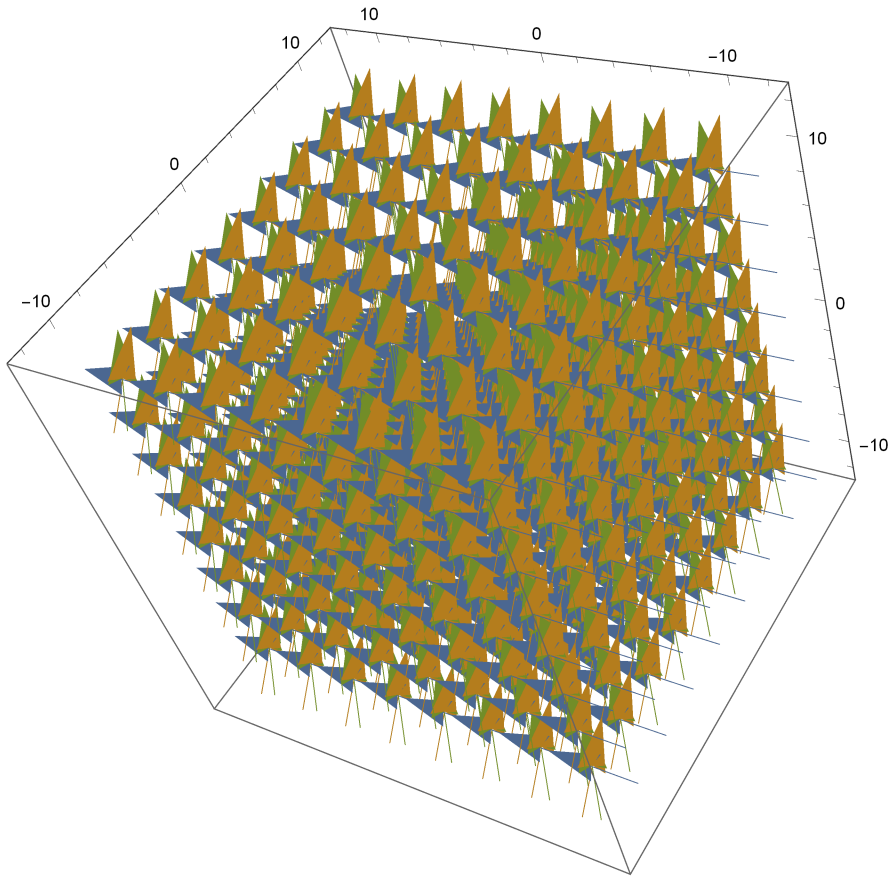
Out[37]=



Ex. 1 - c.

In[38]:=
```
VectorPlot3D[{{2, 0, 0}, {0, 2, 2}, {2, 2, 3}}, {x, -10, 10}, {y, -10, 10}, {z, -10, 10}]
```

Out[38]=



Ex. 2

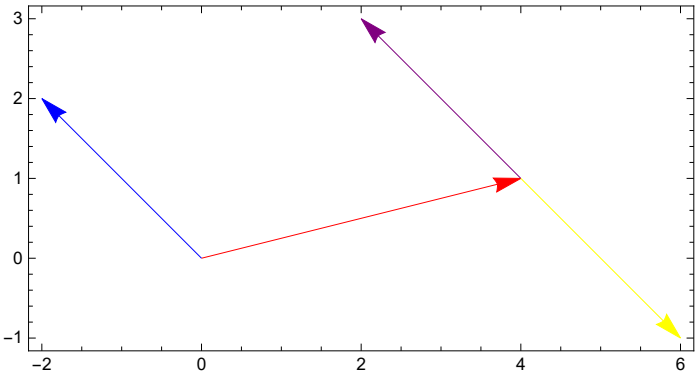
In[649]:=
```
o = {0, 0}
v = {4, 1}
w = {-2, 2}
Graphics[{{Red, Arrow[{o, v}]}, {Blue, Arrow[{o, w}]},
  {Purple, Arrow[{v, v + w}]}, {Yellow, Arrow[{v, v - w}]}}, Frame → True]
ClearAll
```

Out[649]= {0, 0}

Out[650]= {4, 1}

Out[651]= {-2, 2}

Out[652]=



Out[653]= ClearAll

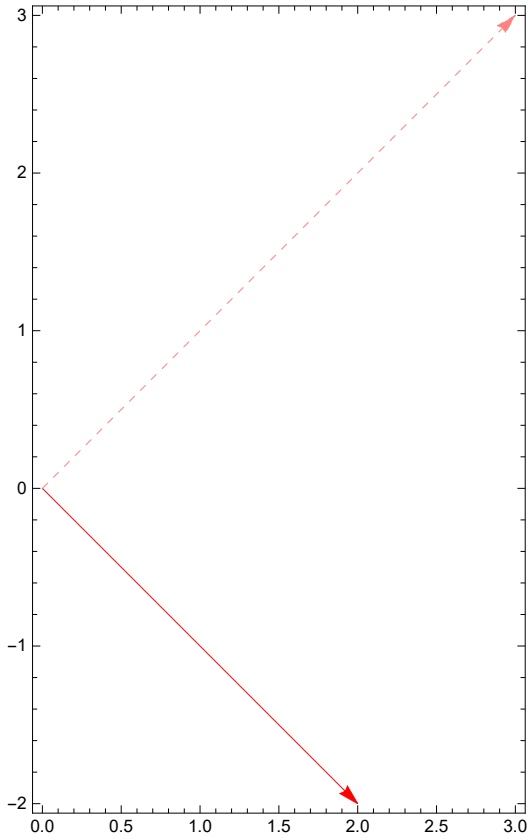
Ex. 3

In[654]:=
```
o = {0, 0}
Solve[v1 + w1 == 5 && v1 - w1 == 1 && v2 + w2 == 1 && v2 - w2 == 5]
Graphics[
 {{Dashed, Pink, Arrow[{o, {3, 3}}]}, {Red, Arrow[{o, {2, -2}}]}}, Frame → True]
v =
 w = .
```

Out[654]=
```
{0, 0}
```

Out[655]=
```
{{v1 → 3, v2 → 3, w1 → 2, w2 → -2}}
```

Out[656]=



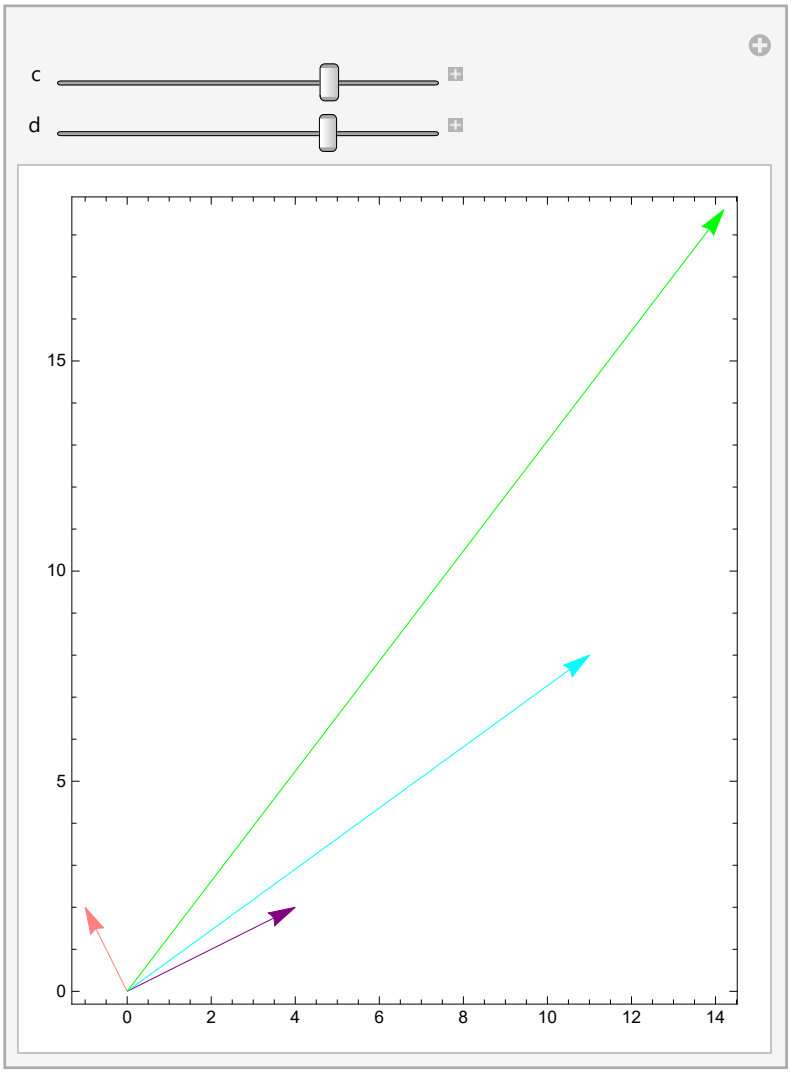
Ex. 4

In[795]:=
```
v = {2, 1}
w = {1, 2}
Manipulate[Graphics[{{Purple, Arrow[{{0, 0}, v}]}, {Pink, Arrow[{{0, 0}, w}]},
    {Cyan, Arrow[{{0, 0}, 3 * v + w}]}, {Green, Arrow[{{0, 0}, c * v + d * w}]}},
  Frame → True], {c, -10, 10}, {d, -10, 10}]
```

Out[795]= {2, 1}

Out[796]= {1, 2}

Out[797]=



Thread::tdlen : Objects of unequal length in 3 {0, 0} {1, −2, 1} cannot be combined. >>

Thread::tdlen : Objects of unequal length in 4.7 {0, 0} {1, −2, 1} cannot be combined. >>

Ex. 5

In[789]:=
```
u = {1, 2, 3}
v = {-3, 1, -2}
w = {2, -3, -1}
LinearSolve[u + v + w]

Graphics3D[{InfinitePlane[{0, 0, 0}, {u, w}]},
 {InfinitePlane[{0, 0, 0}, {u, v}]}, {InfinitePlane[{0, 0, 0}, {u, w}]}]
```

Out[789]= {1, 2, 3}

Out[790]= {-3, 1, -2}

Out[791]= {2, -3, -1}

LinearSolve::matrix : Argument {0, 0, 0} at position 1 is not a non–empty rectangular matrix. >>

Out[792]= LinearSolve[{0, 0, 0}]

Ex. 6 - (*Como???????????*)

In[1183]:=
```
d = .
c = .

v1 = 1
v2 = -2
v3 = 1
w1 = 0
w2 = 1
w3 = -1
Solve[c * 1 + d * 0 == 3 && c * (-2) + d * 1 == 3 & c * 1 + d * (-1) == 6, {c, d}]
```

Out[1185]= 1

Out[1186]= -2

Out[1187]= 1

Out[1188]= 0

Out[1189]= 1

Out[1190]= -1

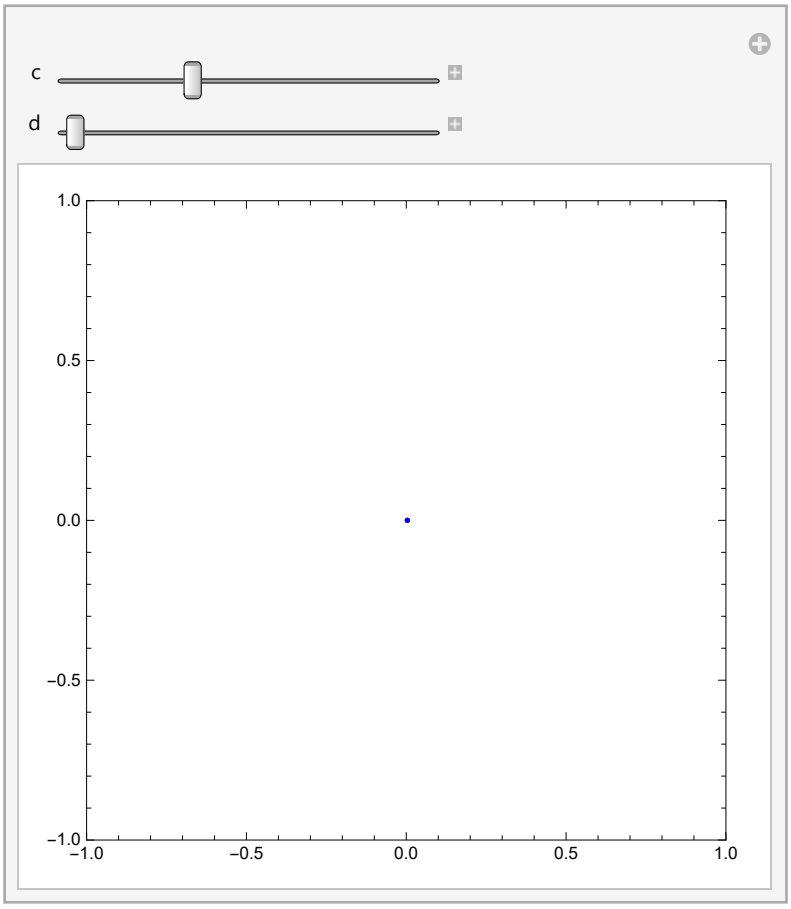
Solve::nsmet : This system cannot be solved with the methods available to Solve. >>

Out[1191]= Solve[-d + c (c 1 + d 0 == 3 && c (-2) + d 1 == 3 &) == 6, {c, d}]

Ex. 7

In[1277]:=
```
d = .
c = .
Manipulate[Graphics[{{Red, Arrow[{{0, 0}, {2 * IntegerPart[c], IntegerPart[c]}}]},
   {Blue, Arrow[{{0, 0}, {0, IntegerPart[d]}}]}}, Frame → True], {c, 0, 2}, {d, 0, 2}]
```

Out[1279]=



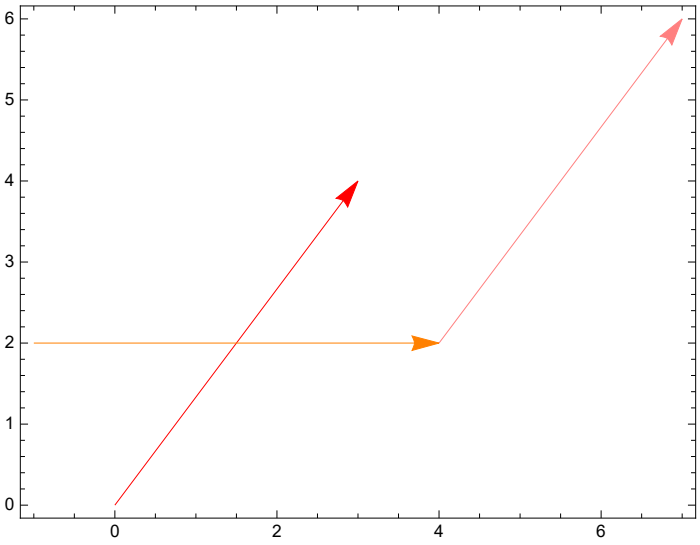
Ex. 8

In[1310]:=
```
v = {4, 2}
w = {-1, 2}
Graphics[{{Red, Arrow[{{0, 0}, v + w}]},
  {Orange, Arrow[{w, v}]}, {Pink, Arrow[{v, 2 * v + w}]}}, Frame → True]
```

Out[1310]= {4, 2}

Out[1311]= {-1, 2}

Out[1312]=



Ex. 9

The three other corners are: {-2,2}, {4,0},{4,4}

```
c = d =.
a = {1, 1}
b = {4, 2}
c = {1, 3}
d = {-2, 2}
Graphics[{{Arrow[{a, b}]}, {Arrow[{b, c}]},
  {Pink, Arrow[{c, d}]}, {Pink, Arrow[{d, a}]}}, Frame → True]
Graphics[{{Arrow[{c, a}]}, {Arrow[{b, c}]}, {Purple, Arrow[{a, a - c + b}]},
  {Purple, Arrow[{a - c + b, b}]}}, Frame → True]
```

Out[1486]= {1, 1}

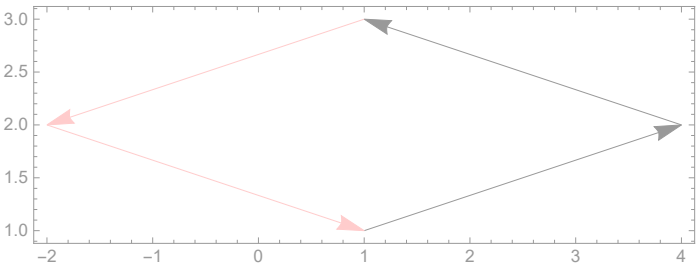
Out[1487]= {4, 2}

Out[1488]= {1, 3}

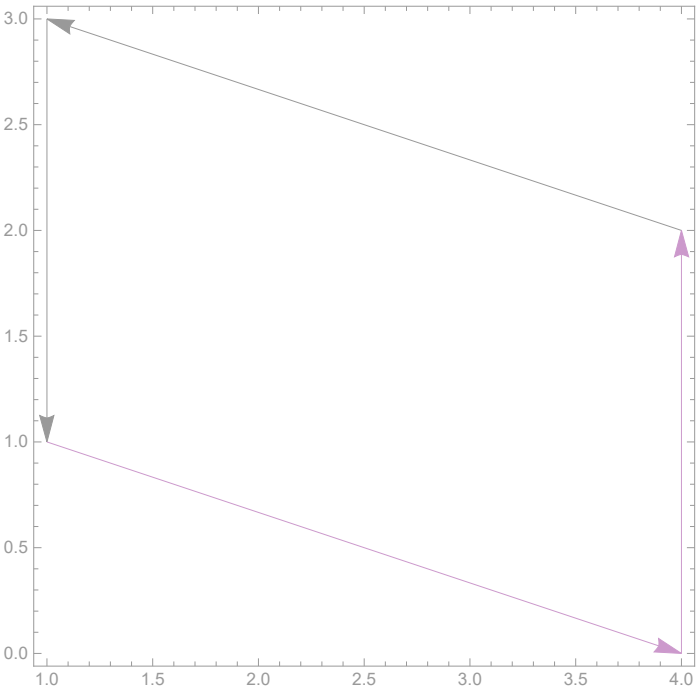
Out[1489]= {-2, 2}

Out[1490]= { }

Out[1491]=



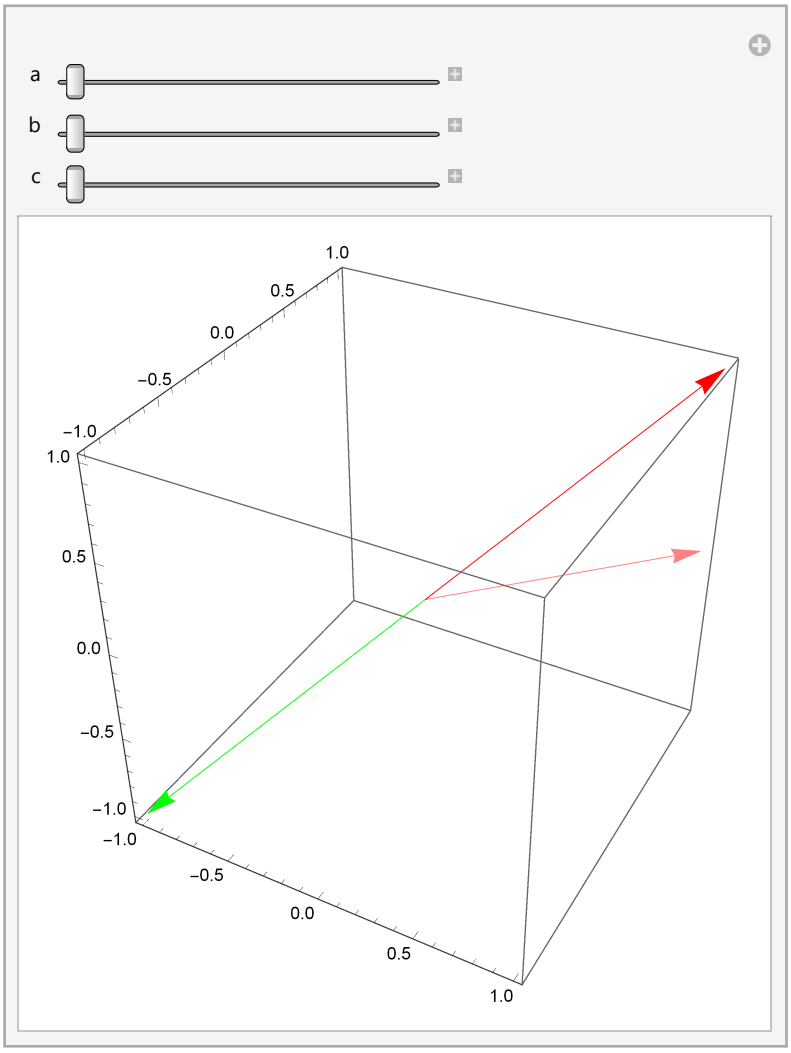
Out[1492]=



Ex. 10

In[1524]:=
```
a = b = c = .
Manipulate[Graphics3D[{{Pink, Arrow[{{0, 0, 0}, {1, 0, 0} + {0, 1, 0}}]},
    {Red, Arrow[{{0, 0, 0}, {1, 0, 0} + {0, 1, 0} + {0, 0, 1}}]},
    {Green, Arrow[{{0, 0, 0}, a * {1, 0, 0} + b * {0, 1, 0} + c * {0, 0, 1}}]}},
  Axes → True], {a, -1, 1}, {b, -1, 1}, {c, -1, 1}]
```

Out[1525]=



Ex. 11