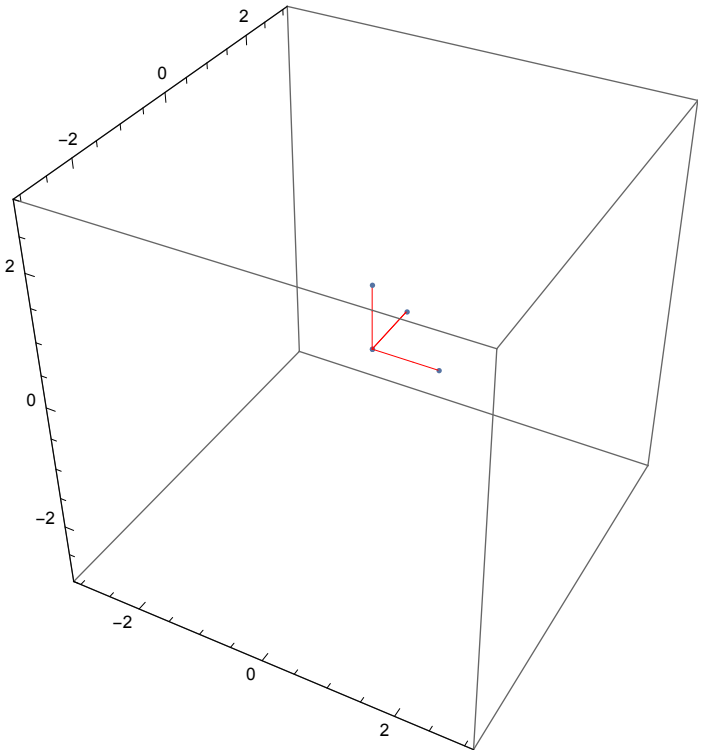
In[1]:=
```
transform3x3[Rmatrix3x3_, Pnx3_] := Transpose[Rmatrix3x3.Transpose[Pnx3]];
frameDraw[frame_] := {frame[[1]], frame[[4]], frame[[2]], frame[[4]], frame[[3]]};
```

In[3]:=
```
R = RotationMatrix[Pi / 2, {1, 0, 0}];
xyzvectors = IdentityMatrix[3];
xyzframe0 = Join[xyzvectors, {{0, 0, 0}}];
forplotting0 = frameDraw[xyzframe0];

range = 3;(*xyz range*)
XYZrange = {{-range, range}, {-range, range}, {-range, range}};
pointplot0 = ListPointPlot3D[forplotting0];
lineplot0 = Graphics3D[{Red, Line[forplotting0]}];
frameplot = Show[pointplot0, lineplot0, PlotRange → range, BoxRatios → {1, 1, 1}]
```

Out[11]=



In[12]:=
```
r1 = RotationMatrix[1.2, {1, 0, 0}];
xyzframe1 = transform3x3[r1, xyzframe0];
forplotting1 = frameDraw[xyzframe1];
pointplot1 = ListPointPlot3D[forplotting1];
lineplot1 = Graphics3D[{Blue, Line[forplotting1]}];
Show[frameplot, pointplot1, lineplot1, PlotRange → range, BoxRatios → {1, 1, 1}]
```

In[18]:=
```
(*interactive version*)
axes = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}};(*x,
y and z axes so we can easily pick which axis to rotate about*)
Manipulate[
 r1 = RotationMatrix[angle, axes[[a]]];
 xyzframe1 = transform3x3[r1, xyzframe0];
 forplotting1 = frameDraw[xyzframe1];
 pointplot1 = ListPointPlot3D[forplotting1];
 lineplot1 = Graphics3D[{Blue, Line[forplotting1]}];
 Show[frameplot, pointplot1,
  lineplot1, PlotRange → range, BoxRatios → {1, 1, 1}]
 , {angle, 0, Pi}, {a, 1, 3, 1}]
```

In[20]:=
```
(*multiple rotations|*)
axes = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}};(*x,
y and z axes so we can easily pick which axis to rotate about*)
Manipulate[
 ra = RotationMatrix[anglea, {0, 0, 1}]; (*third rotation, z*)
 xyzframe1a = transform3x3[ra, xyzframe0];
 rb = RotationMatrix[angleb, {1, 0, 0}]; (*second rotation, x*)
 xyzframe1b = transform3x3[rb, xyzframe1a];
 rc = RotationMatrix[anglec, {0, 0, 1}]; (*third rotation, z*)
 xyzframe1 = transform3x3[rc, xyzframe1b];

 forplotting1 = frameDraw[xyzframe1];
 pointplot1 = ListPointPlot3D[forplotting1];
 lineplot1 = Graphics3D[{Blue, Line[forplotting1]}];
 Show[frameplot, pointplot1,
  lineplot1, PlotRange → range, BoxRatios → {1, 1, 1}]
 , {anglea, 0, Pi}, {angleb, 0, Pi}, {anglec, 0, Pi}]

(*Multiple rotations: alternative method*)
axes = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}};(*x,
y and z axes so we can easily pick which axis to rotate about*)
Manipulate[
 ra = RotationMatrix[anglea, {0, 0, 1}]; (*third rotation, z*)
 xyzframe1a = transform3x3[ra, xyzframe0];
 rb = RotationMatrix[angleb, {1, 0, 0}]; (*second rotation, x*)
 xyzframe1b = transform3x3[rb, xyzframe1a];
 rc = RotationMatrix[anglec, {0, 0, 1}]; (*third rotation, z*)
 xyzframe1 = transform3x3[rc, xyzframe1b];

 ralt = rc.rb.ra; (*all rotations in a single R matrix*)
 xyzframe1alt = transform3x3[ralt, xyzframe0];

 forplotting1 = frameDraw[xyzframe1];
 pointplot1 = ListPointPlot3D[forplotting1];
 lineplot1 = Graphics3D[{Blue, Line[forplotting1]}];

 forplotting1alt = frameDraw[xyzframe1alt];
 pointplot1alt = ListPointPlot3D[forplotting1alt];
 lineplot1alt = Graphics3D[{Green, Dashed, Line[forplotting1alt]}];
 Show[frameplot, pointplot1, lineplot1, pointplot1alt,
  lineplot1alt, PlotRange → range, BoxRatios → {1, 1, 1}]
 , {anglea, 0, Pi}, {angleb, 0, Pi}, {anglec, 0, Pi}]
```