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% gda10_03

% visualizatio of two different sets of factors
% was vectors in 3D space
% Supports Figure 10.4

% 3D box in (x,y,z) space
xmin = 0;
xmax = 1;
Lx = xmax-xmin;

ymin = 0;
ymax = 1;
Ly = ymax-ymin;

zmin = 0;
zmax = 1;
Lz = zmax-zmin;

% plot
figure(1);
clf;
set(gca, 'LineWidth',3);
set(gca, 'FontSize',14);
hold on;
axis( [xmin, xmax, ymin, ymax, zmin, zmax]);

% factors for Case 1
% factor 1
f1 = [1, 0.2, 0.8]';
norm = 1.2*sqrt(f1'*f1);
f1=f1/norm;

% factor 2
f2 = [0.2, 1, 0.8]';
norm = 0.8*sqrt(f2'*f2);
f2=f2/norm;

arrow3(f1, 'r-',3);
arrow3(f2, 'r-',3);

% samples
s1=0.8*f1+(1-0.8)*f2;
s2=0.6*f1+(1-0.6)*f2;
s3=0.4*f1+(1-0.4)*f2;
s4=0.2*f1+(1-0.2)*f2;
arrow3(s1, 'k-',2);
arrow3(s2, 'k-',2);
arrow3(s3, 'k-',2);
arrow3(s4, 'k-',2);

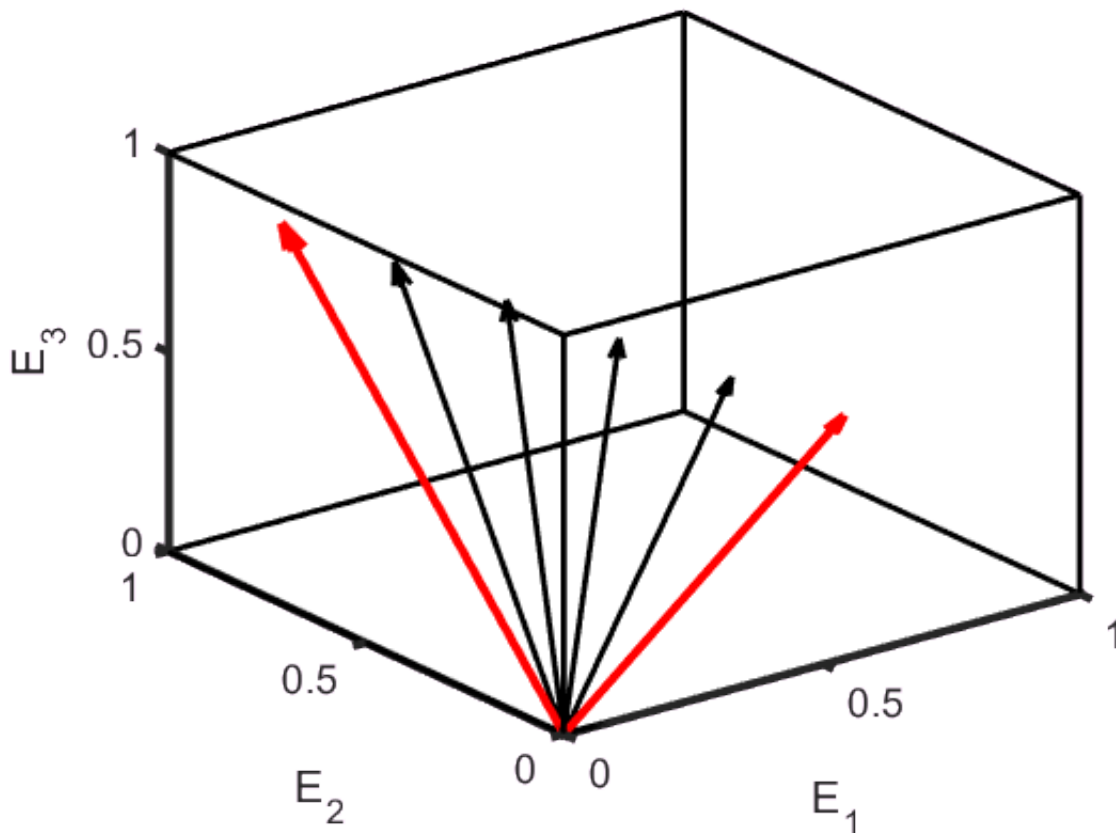
% improvise 3D box
plot3( [xmin,xmin], [ymin,ymin], [zmin,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmin], [ymin,ymax], [zmin,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmax], [ymin,ymin], [zmin,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymax,ymax], [zmax,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymax,ymin], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmin], [ymax,ymax], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmin], [ymin,ymin], [zmax,zmax], 'k-', 'LineWidth', 2 );

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plot3( [xmax,xmax], [ymin,ymin], [zmax,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmin], [ymax,ymin], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmin], [ymax,ymax], [zmax,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymax,ymin], [zmin,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmin], [ymax,ymax], [zmin,zmin], 'k-', 'LineWidth', 2 );
xlabel('E_1');
ylabel('E_2');
zlabel('E_3');
view(3);

```



% Figure 10.4 Any two factors $f(1)$ and $f(2)$ (red arrows) that lie in the plane of the samples and that bound the range of sample compositions (black arrows) are acceptable, such as those shown in the figure, above. MatLab script gda10_03.

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% plot
figure(2);
clf;
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [xmin, xmax, ymin, ymax, zmin, zmax]);

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% factors for Case 2
f1a = [1, 0.2, 0.8]';
norm = 1.2*sqrt(f1a'*f1a);
f1a=f1a/norm;

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f2a = [0.2, 1, 0.8]';
norm = 0.8*sqrt(f2a'*f2a);
f2a=f2a/norm;

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f1 = f1a+0.2*f2a;
norm = 1.2*sqrt(f1'*f1);
f1=f1/norm;

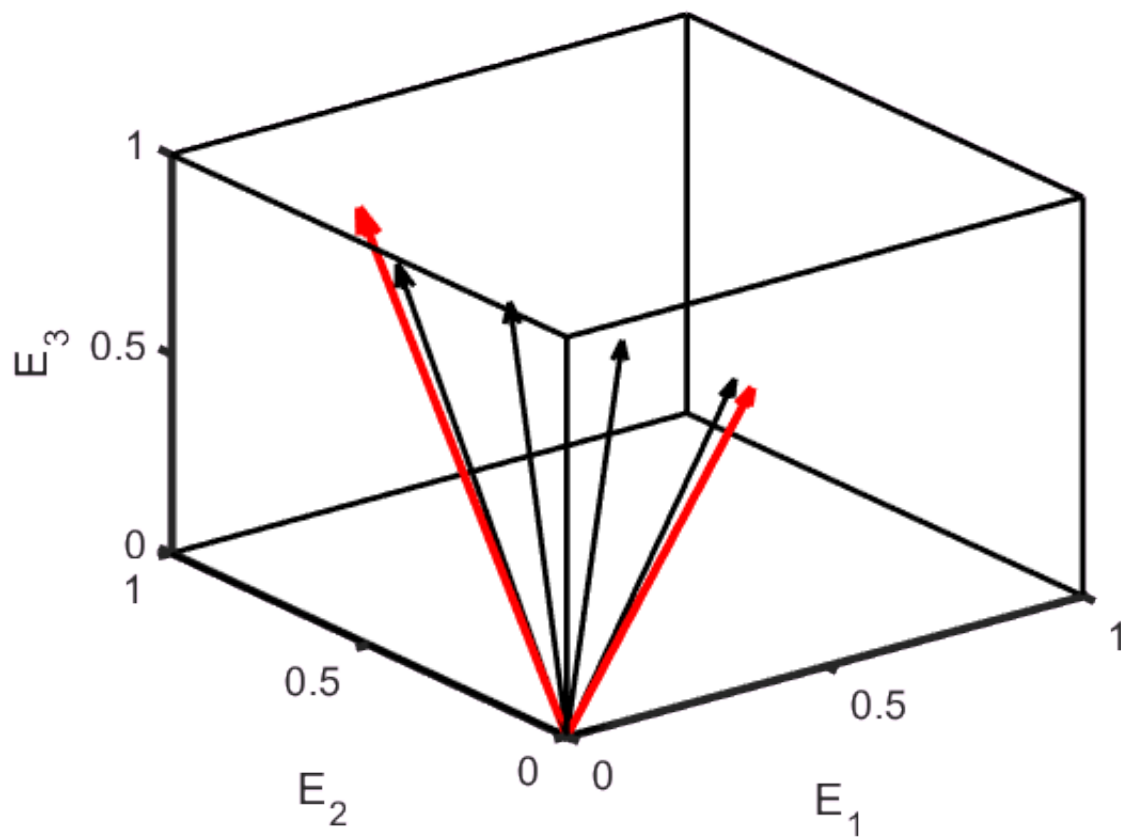
f2 = f2a + 0.2*f1a;
norm = 0.8*sqrt(f2'*f2);
f2=f2/norm;

arrow3(f1,'r-',3);
arrow3(f2,'r-',3);

arrow3(s1,'k-',2);
arrow3(s2,'k-',2);
arrow3(s3,'k-',2);
arrow3(s4,'k-',2);

% improvise 3D box
plot3( [xmin,xmin], [ymin,ymin], [zmin,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmin], [ymin,ymax], [zmin,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmax], [ymin,ymin], [zmin,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymax,ymax], [zmax,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymax,ymin], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmin], [ymax,ymax], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmin], [ymin,ymin], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymin,ymin], [zmax,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmin], [ymax,ymin], [zmax,zmax], 'k-', 'LineWidth', 2 );
plot3( [xmin,xmin], [ymax,ymax], [zmax,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmax], [ymax,ymin], [zmin,zmin], 'k-', 'LineWidth', 2 );
plot3( [xmax,xmin], [ymax,ymax], [zmin,zmin], 'k-', 'LineWidth', 2 );
xlabel('E_1');
ylabel('E_2');
zlabel('E_3');
view(3);

```



% Figure 10.4 Any two factors $f(1)$ and $f(2)$ (red arrows) that lie in the plane of the samples
 % and that bound the range of sample compositions (black arrows) are acceptable, such as those
 % shown in the figure, above. MatLab script gda10_03.