```
Data=xlsread('SE160A_Project2_InputFile.xlsx','Stress');


%Stress State
oxx=40;
oyy=-30;
ozz=0;
tyz=0;
txz=0;
txy=10;

%Material Properties
oyt=Data(11,1);
out=Data(12,1);
oyc=Data(13,1);
ouc=Data(14,1);
ty=Data(15,1);
tu=Data(16,1);
FSY=Data(17,1);
FSU=Data(18,1);

%(1) Allowable tension stress
otallow=(oyt/FSY)
ocallow=(oyc/FSY)
tallow=(ty/FSY)


otallow =

       16.364


ocallow =

      -16.364


tallow =

       12.727


%(2) Principal Stress
a=[oxx txy txz;txy oyy tyz;txz tyz ozz];
b=eig(a);
p1=b(3)
p2=b(2)
p3=b(1)


p1 =

       41.401
```

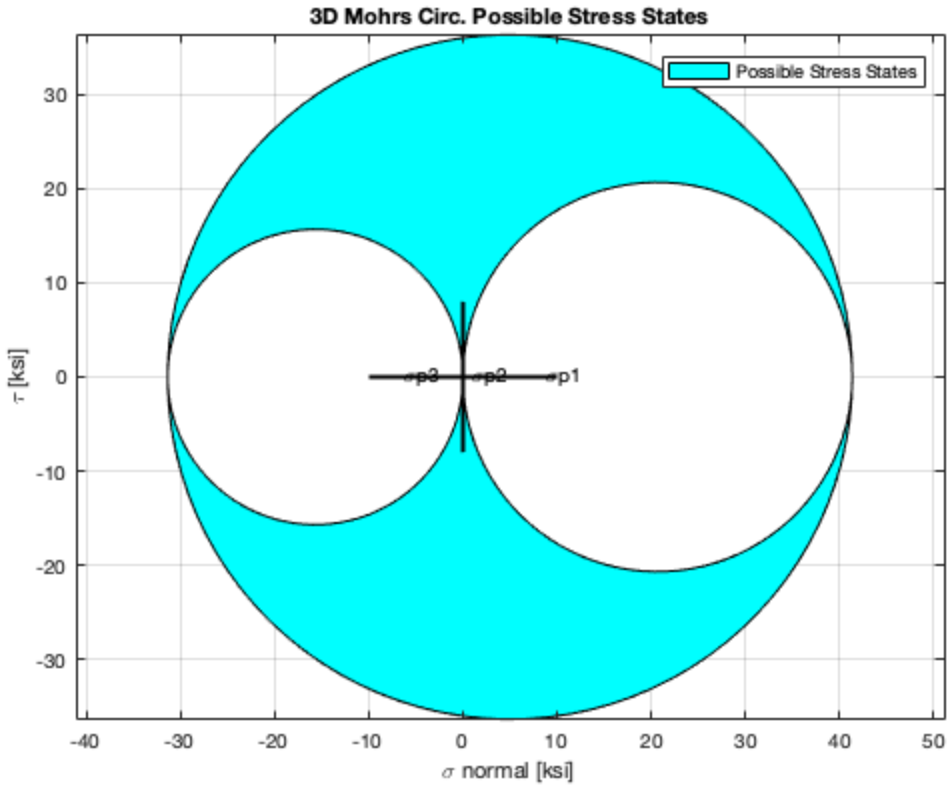
```
p2 =

     0


p3 =

      -31.401
```

```
%(3)Max shear
maxshear=(p1-p2)/2
```

```
maxshear =

         20.7
```

```
%(4)Plotting mohrs circle
x=(p1+p3)/2;
y=0;
r=(p1-p3)/2;
th=linspace(0,2*pi,100);
a=(r*cos(th))+x;
b=(r*sin(th))+y;
plot1=fill(a,b,'c');
axis equal
grid on
hold on

x1=(p3+p2)/2;
y1=0;
r1=(p2-p3)/2;
th1=linspace(0,2*pi,100);
a1=(r1*cos(th1))+x1;
b1=(r1*sin(th1))+y1;
plot2=fill(a1,b1,'w');
axis equal
grid on
hold on

x2=(p1+p2)/2;
y2=0;
r2=(p1-p2)/2;
th2=linspace(0,2*pi,100);
a2=(r2*cos(th2))+x2;
b2=(r2*sin(th2))+y2;
plot3=fill(a2,b2,'w');
axis equal
grid on
```

```
xlabel('\sigma normal [ksi]'); title('3D Mohrs Circ. Possible Stress
 States')
ylabel('\tau [ksi]')

x3=linspace(0,0);
y3=linspace(-8,8);
plot4=plot(x3,y3,'k','Linewidth',2);

x4=linspace(-10,10);
y4=linspace(0,0);
plot5=plot(x4,y4,'k','Linewidth',2);
text(-6.3,.3,'\sigmap3')
text(1,.3,'\sigmap2')
text(8.9,.3,'\sigmap1')

legend(plot1,{'Possible Stress States'})
```




```
%(5)MOS

mstresca=[((otallow/p1)-1) ((ocallow/p3)-1) (((tallow)/maxshear)-1)];
disp('margin of safety tresca')
min(mstresca)
%minhere is last term


msrankine=[((otallow/p1)-1) ((ocallow/p3)-1)];
```

```
disp('margin of safety rankine')
min(msrankine)
%min here is 1st term

oeff=sqrt((((p1-p2)^2)+((p2-p3)^2)+((p3-p1)^2))/2);
disp('margin of safety von mises')
msvm=(otallow/oeff)-1
```

```
margin of safety tresca

ans =

     -0.60475

margin of safety rankine

ans =

     -0.60475

margin of safety von mises

msvm =

     -0.74127
```

```
%(6)Max stress states
tensor=[oxx txy txz;txy oyy tyz;txz tyz ozz];

disp('max stress state tresca')
(tallow)/(maxshear)*tensor



disp('max stress state rankine')
((otallow/p1))*tensor


disp('max stress state von mises')
(otallow/oeff)*tensor
```

```
max stress state tresca

ans =

       24.593       6.1484            0
       6.1484      -18.445            0
            0            0            0

max stress state rankine

ans =
```

```
        15.81       3.9525            0
       3.9525      -11.858            0
            0            0            0

max stress state von mises

ans =

       10.349       2.5873            0
       2.5873       -7.762            0
            0            0            0


%vector
[otallow ocallow tallow p1 p2 p3 maxshear min(msrankine) min(mstresca)
 msvm]


ans =

  Columns 1 through 6

       16.364      -16.364       12.727       41.401            0
 -31.401

  Columns 7 through 10

         20.7     -0.60475     -0.60475     -0.74127
```

principle angle

```
.5*acosd(sqrt((1/(1+(((2*txy)/(oyy-oxx))^2)))))


ans =

       7.9727
```

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