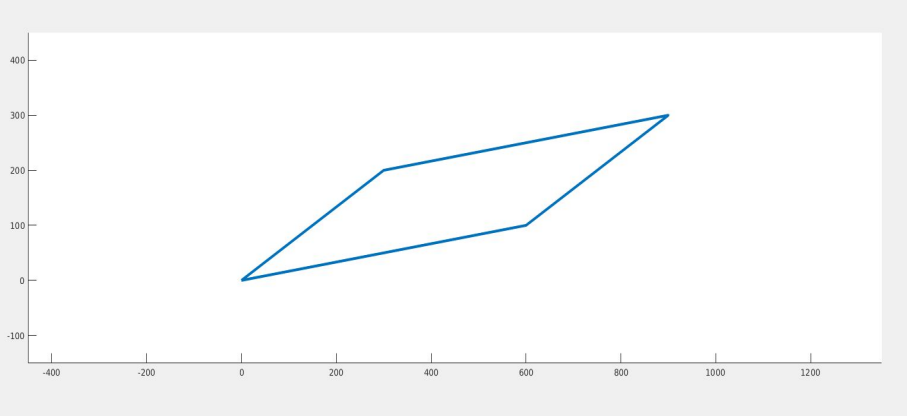
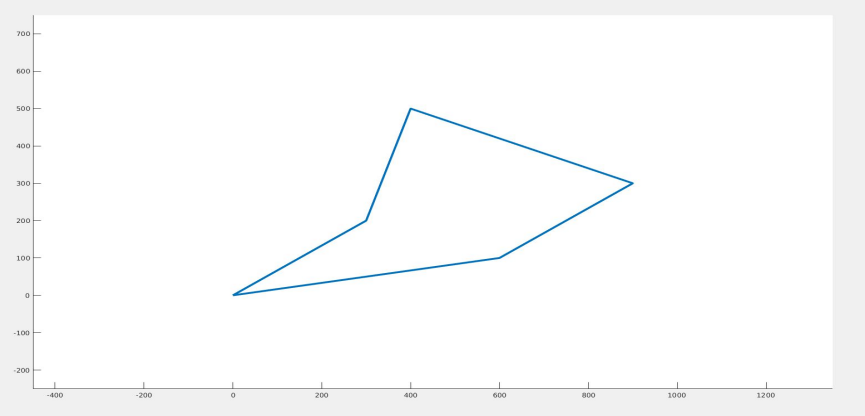
Project 2

Grasp Quality on Planar Parts

Polygon Definition

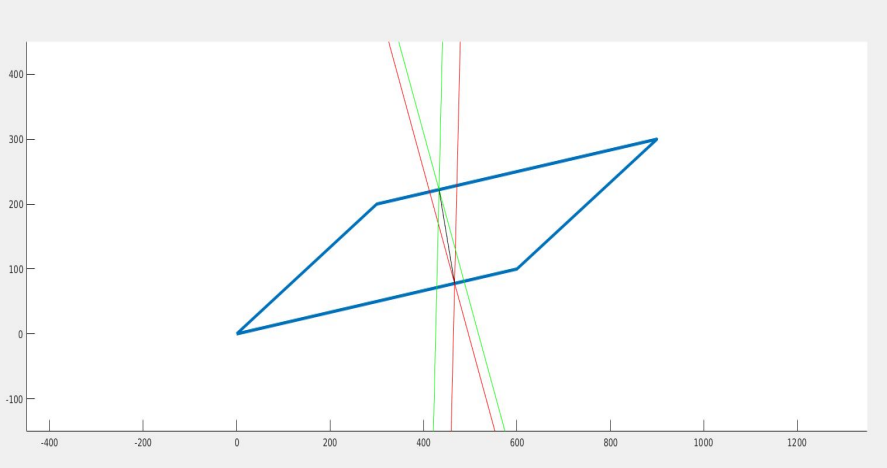


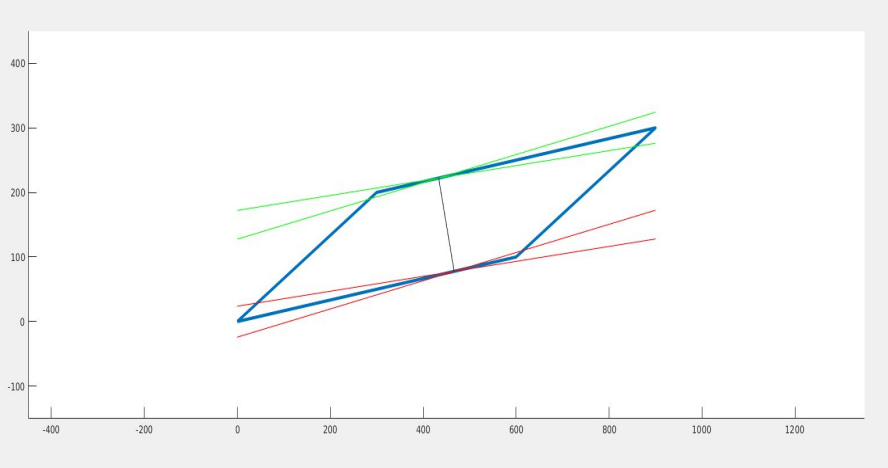


The user inputs vertices for the polygon and the program outputs the polygons as shown above.
Example usage:

```
v = [0, 0; 600, 100; 900, 300; 300, 200];
polygon(v);
```

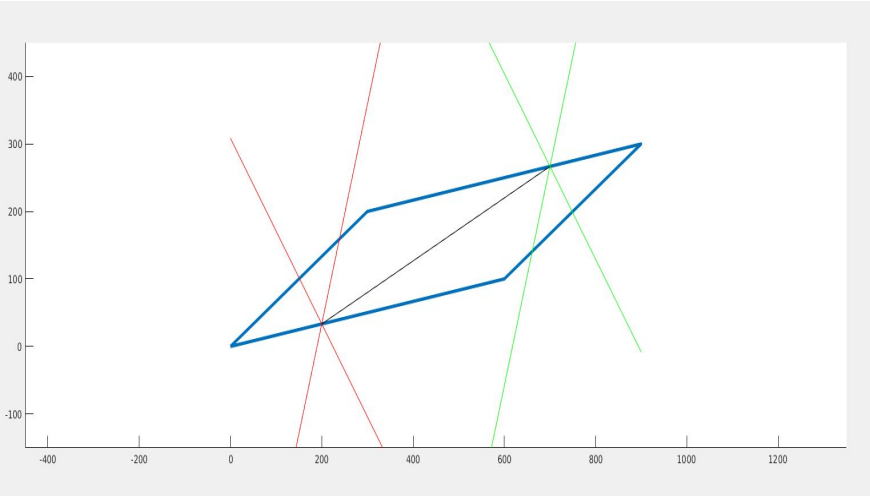
Cone Size based on Friction Coefficient

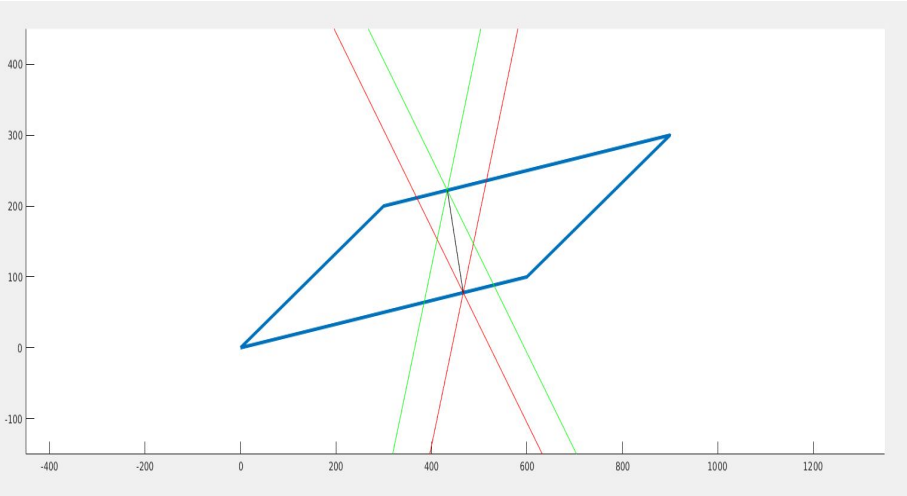




The user inputs 2 line segments of choice and a point on those lines to produce the cone output shown above. The user can adjust the cone size by changing the friction coefficient from 0-inf.

Determining Force Closure



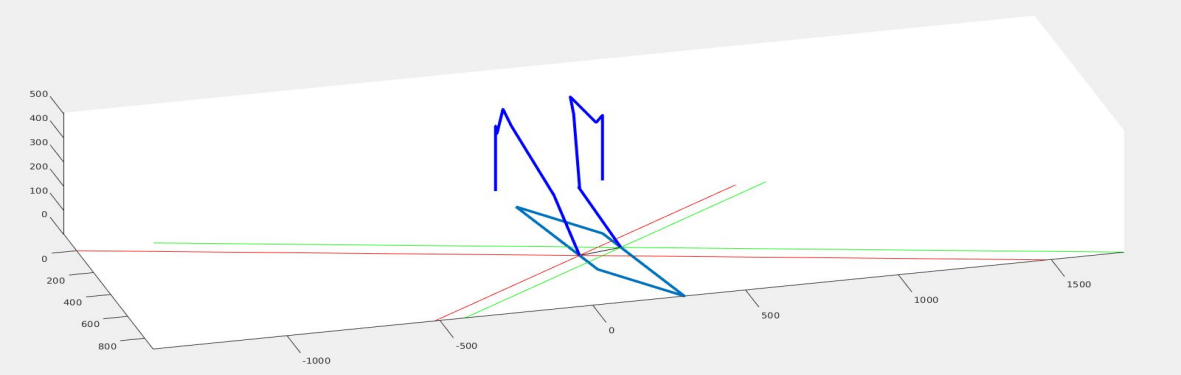


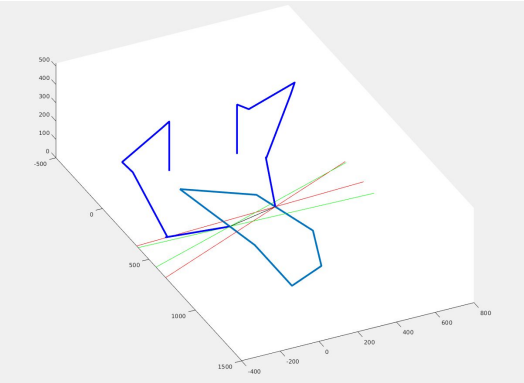
After the user inputs the line segments of choice and corresponding points on the line, the program determines if the 2 contact points are in force closure using the antipodal grasp theorem.

Example usage:

```
v = [0, 0; 600, 100; 900, 300; 300, 200];
u = 1;
ang = rad2deg(atan(u));
%[x_coordinate_line_1, y_coordinate_line_1, x_coordinate_line_2, y_coordinate_line_2, Force_Closure_Flag]
%                       = det_fr_cls(vertices, line_choice_1, line_choice_2, point_on_line_1, point_on_line_1, cone_angle);
[x0, y0, x1, y1, fc] = det_fr_cls(v, 1, 3, 8, 8, ang); % return 1 if force closure and 0 otherwise
```

Plotting Robot Grasp Configuration





Here we see the 2 robot grasping the polygon at defined points when force closure is true. Sample usage:

%plt_rbt(vertices, x_coordinate_line_1, y_coordinate_line_1, x_coordinate_line_2, y_coordinate_line_2, Force_Closure_Flag);

plt_rbt(v, x1, y1, x0, y0, fc);