

Polygon Creator

Kwa Yu Heng

U2122731B

Table of Contents

Shortcuts	1
Run Through of App	2
App Capabilities	6
Polygon Creation	6
Displaying a Polygon	7
Manipulating a Polygon	7
Analytical Tools using a Polygon	11
File Input/Output	13
Strengths	14
Weaknesses	17

Shortcuts

Left click: Draw the lines from point to point.

Right click: To input coordinates with your keyboard.

Spacebar: Will complete polygon by returning to the origin.

p: Will print perimeter (in text box). If pressed before polygon complete, will prompt error.

c: Change vertices. Follow steps afterwards. Will prompt error if polygon incomplete too. *If user tries to delete point when only 3 vertices(triangle), deletion will not be allowed to prevent destruction of polygon.*

m: To move polygon

i: Input file containing polygon data

r: Rotate polygon a certain amount of degrees

t: Point inclusion test to check if point lies in polygon

q: Quit the program

x: Select polygon by specifying a vertex corresponding to polygon of choice

d: Duplicates the polygon

f: Read in file

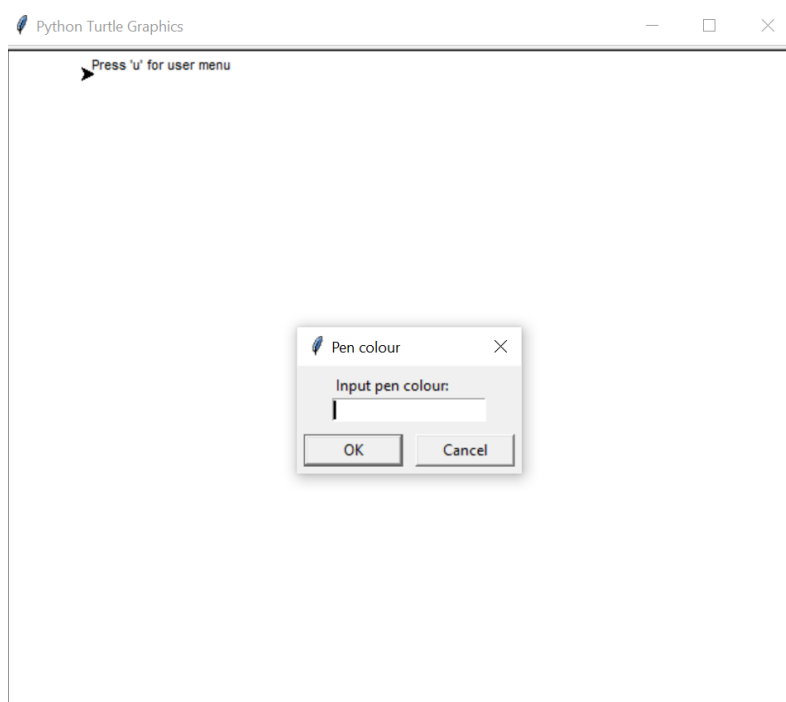
Upon completion of polygon, will prompt for analytical tools too. Analysis can be after polygon complete too; so long as polygon is completed. Just do not click to initialise.

NOTE:

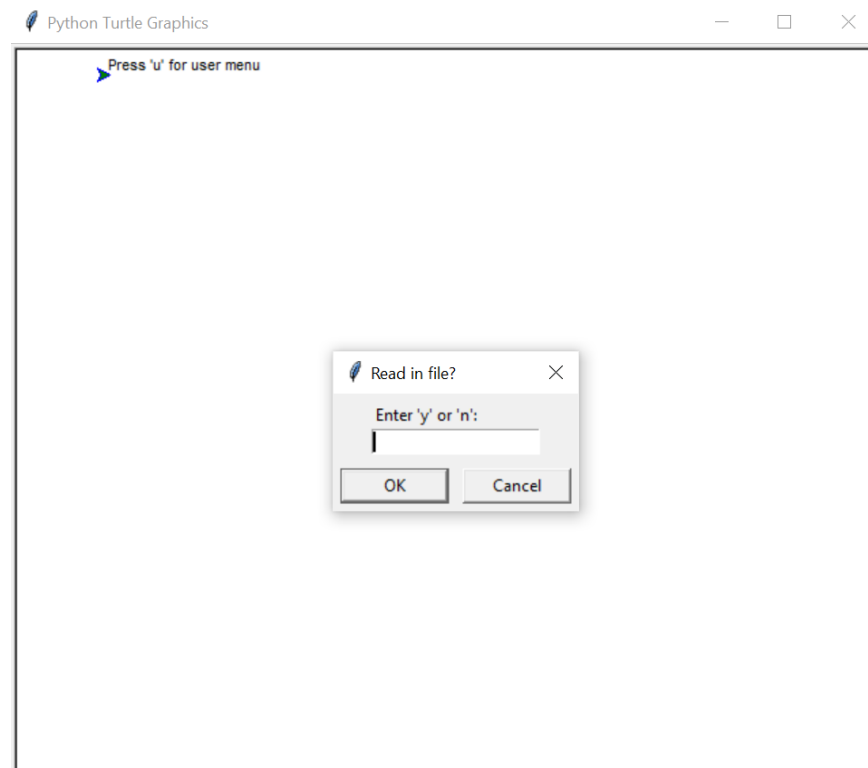
- (i) If pressing button does not work, click **Tab** before pressing key again to get back to the window of the turtle screen. It seems to be a turtle bug whereby you are taken off the main screen when a popup appears.
- (ii) The user also must click on the screen once to initialise and store the polygon if he wants to manually build more polygons. Upon clicking to initialise, he will immediately be prompted to input pen and fill colours for the next polygon too.

Run Through of App

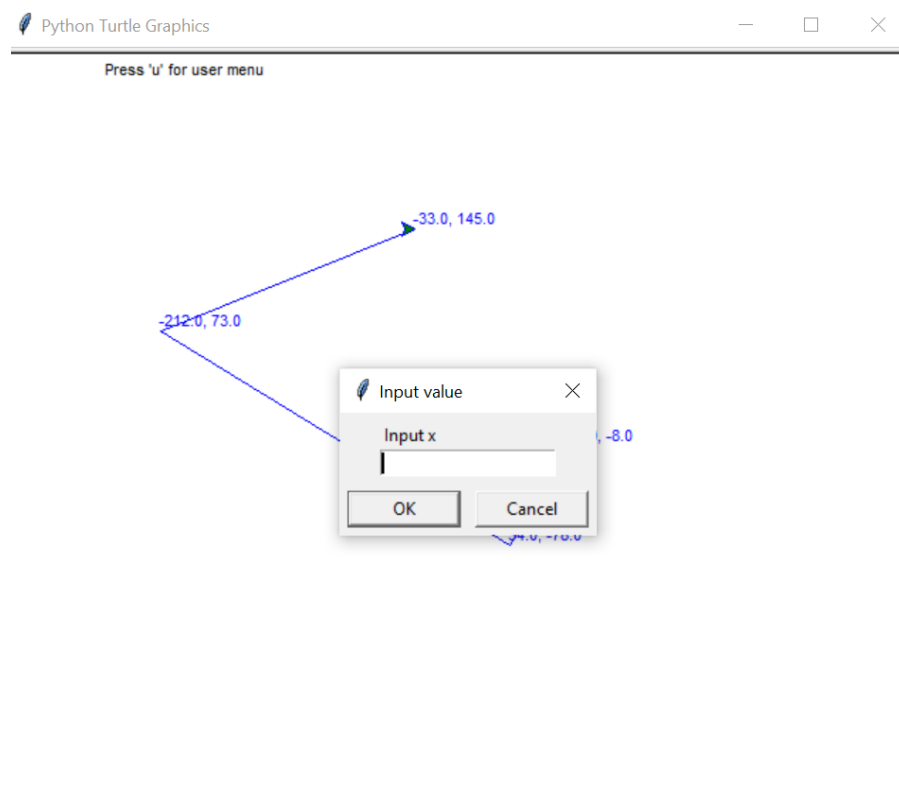
Upon opening the app, the user will be prompted to input pen colour and fill colour.



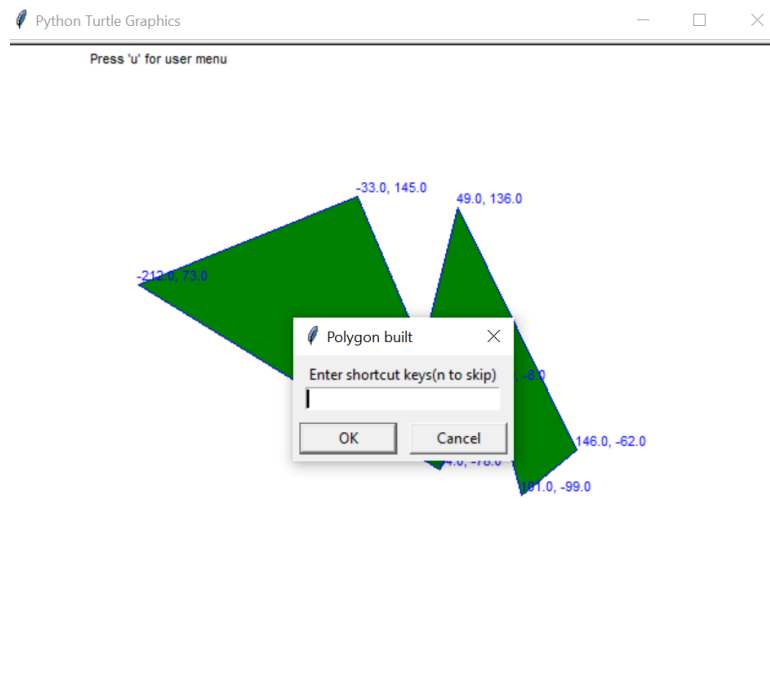
The user will then be able to choose to load a file containing polygon data.



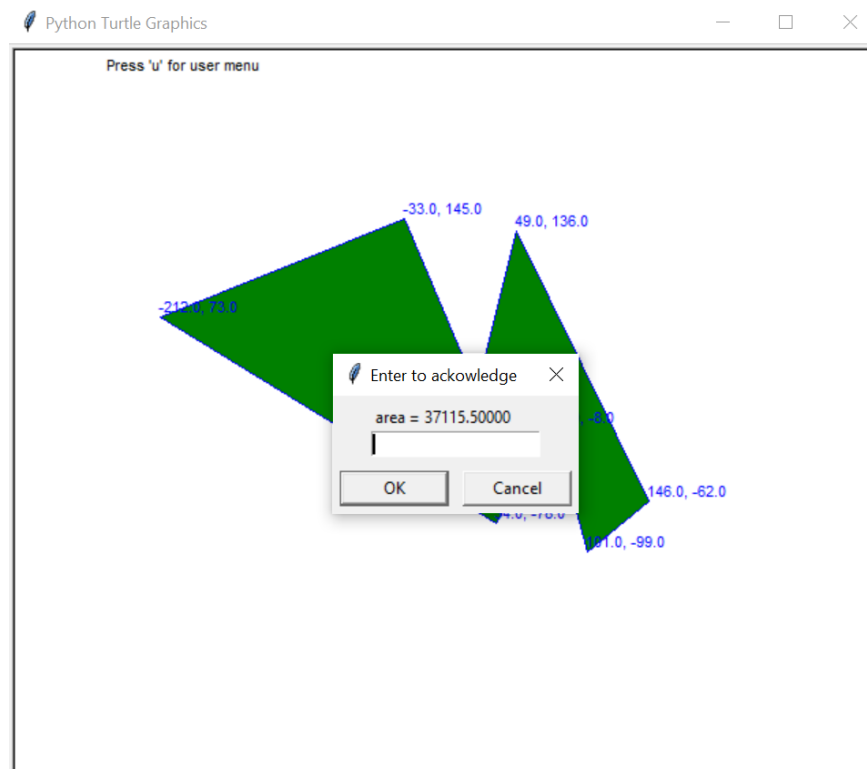
Polygon can be created by clicking or right clicking to form points.



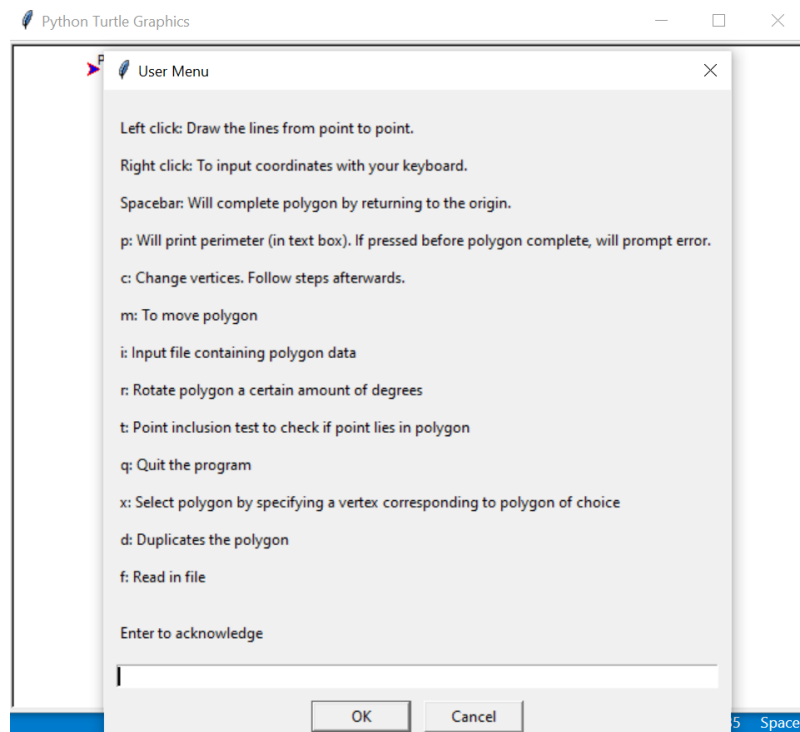
When the user is happy with the polygon created, press the spacebar button to join the first and last point and complete the polygon.



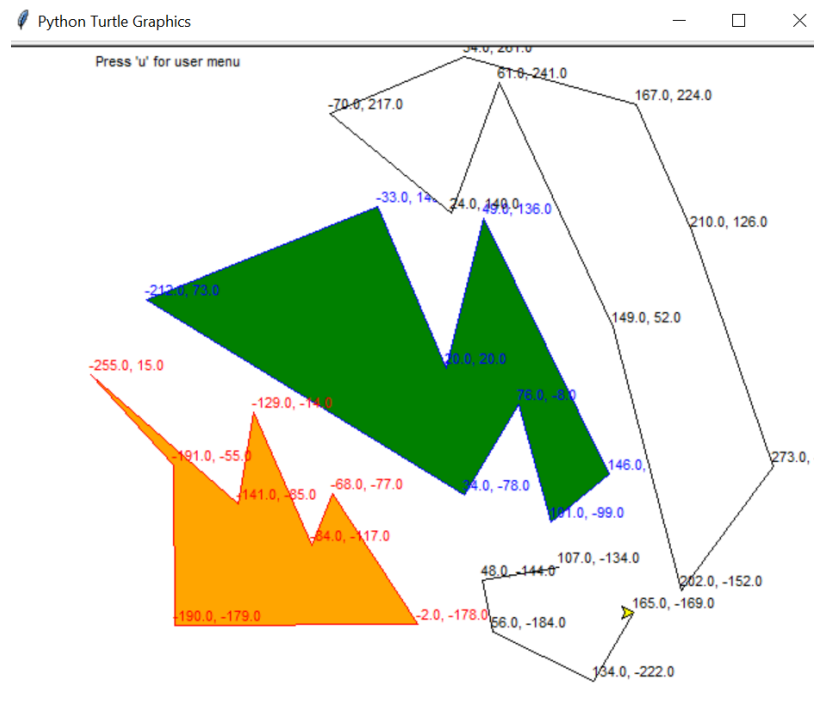
A screen will automatically pop up where shortcuts can be entered for different functionalities of the code to be called. For example, if "a" is keyed in, the area of the polygon will be retrieved.



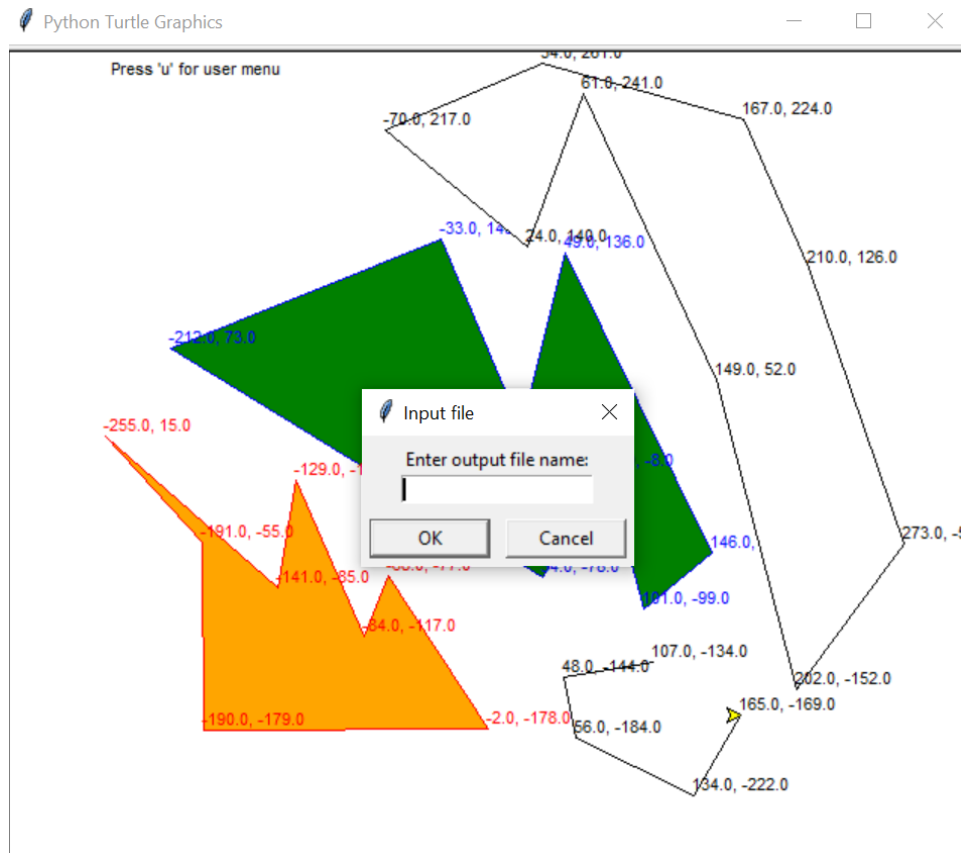
The user will always be brought back to the “polygon built” popup where he can call different functions until he is satisfied, then “n” to skip. If the user is unsure of which keys to input for the correct shortcut, he can simply enter u inside this popup or on the screen.



However, if “u” is pressed, you will not be brought to the “polygon built” window. However, you can directly access the other functions by pressing the relevant keys directly on the turtle screen.



Multiple polygons can be built by following the previous steps mentioned. When the user is satisfied with the polygons created, he can quit the program by pressing “q”, either after the polygon is built or while building a polygon. However, if “q” is pressed while a polygon is not completely built, that polygon will not be saved.



The user will be prompted to provide a name to save the file as, for storage and loading back again if needed.

App Capabilities

Polygon Creation

Polygons can be created by (i) clicking on screen by default, (ii) right clicking to enter coordinates, (iii) reading in file, either at the start when prompted by default or after a polygon is built and “f” is entered.

All polygons of any shape and any numbers of edges can be created, with a mix of clicking and entering coordinates, as long as they lines forming polygon do not self intersect, else an error will be prompted immediately and the user is also blocked from creating such a polygon.

Displaying a Polygon

Before the creation or building of a polygon, the user will always be prompted to provide an input for both pen and fill colour. If user does not wish for any fill colour, simply press enter and there will be no fill.

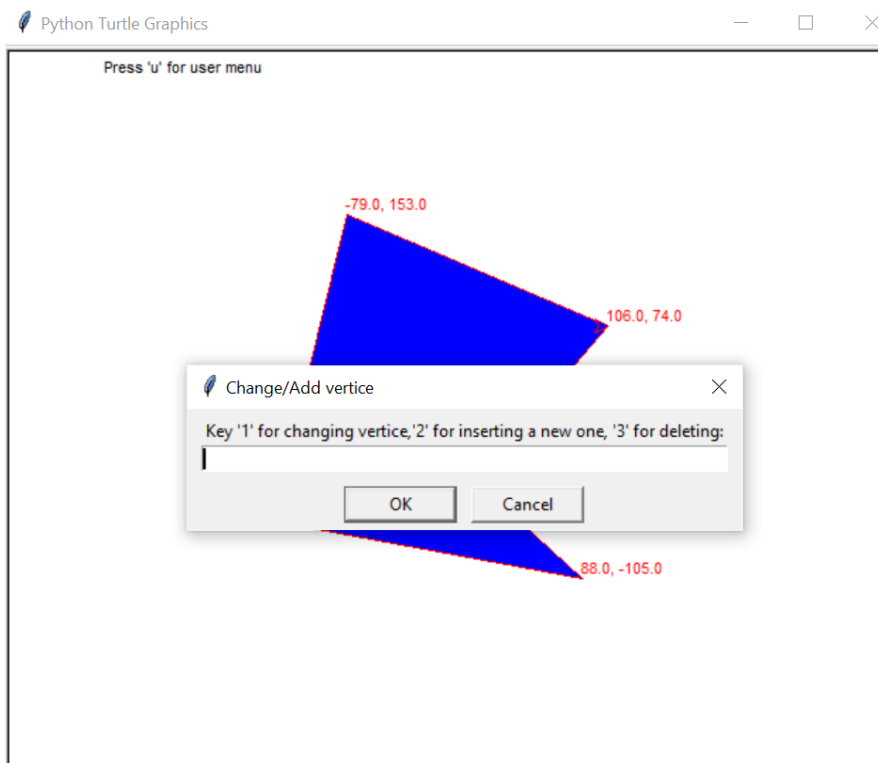
By default, pressing enter when prompted for pen colour provides a black pen and a transparent fill when enter pressed.

Manipulating a Polygon

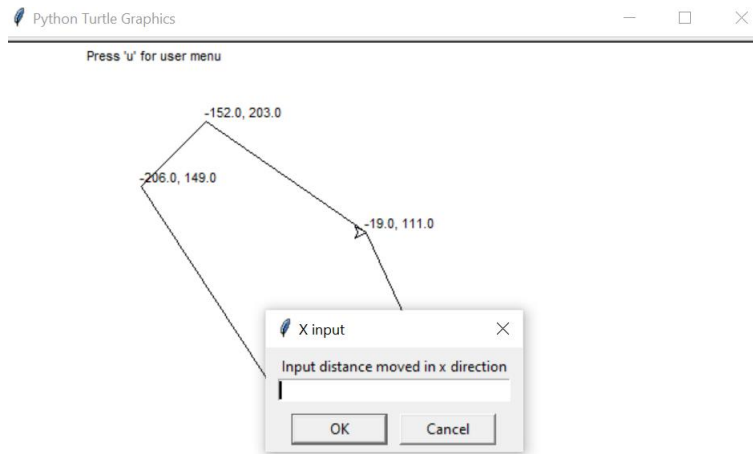
Polygons can be manipulated. When manipulated, the polygon is redrawn in white and filled white, effectively “erasing” the old polygon. The changed polygon is then rebuilt in place of the original.

NOTE: a problem with turtle is that the coordinates of the vertices are not drawn exactly over the old one, resulting in old points being left behind.

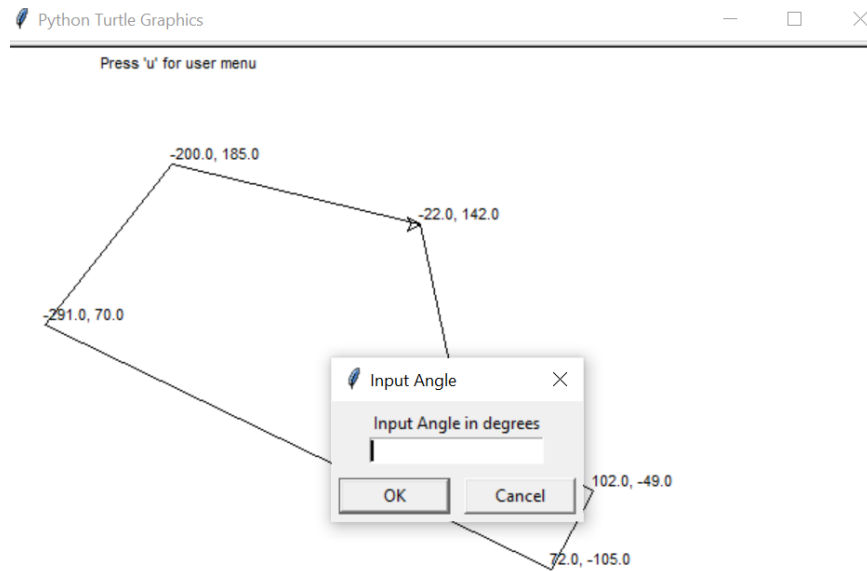
- (a) **Modifying vertices:** When changing vertices (by pressing key “c” or entering into “polygon built” popup upon completion of a polygon), the user has 3 options to work with. Pressing “1” changes a vertex which you choose by specifying the index of that vertice, “2” inserts a new one at the end, and “3” deletes a vertice of your choice.



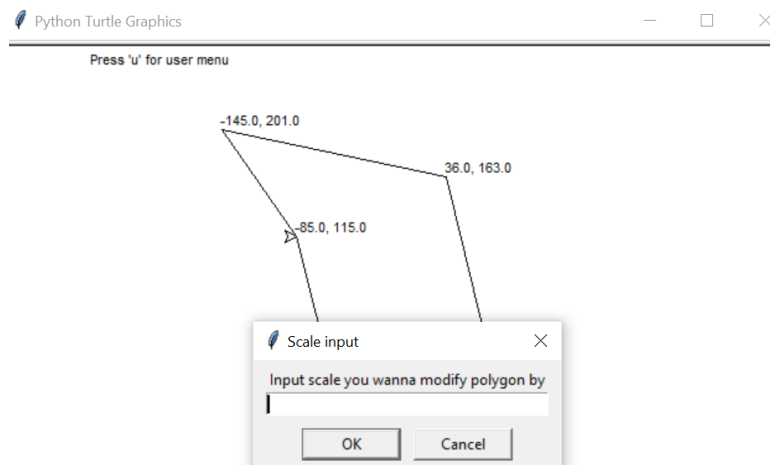
- (b) **Moving polygon:** The polygon can be moved too (by pressing key “m” or entering into “polygon built” popup upon completion of a polygon). After specifying x and y direction to move polygon by,



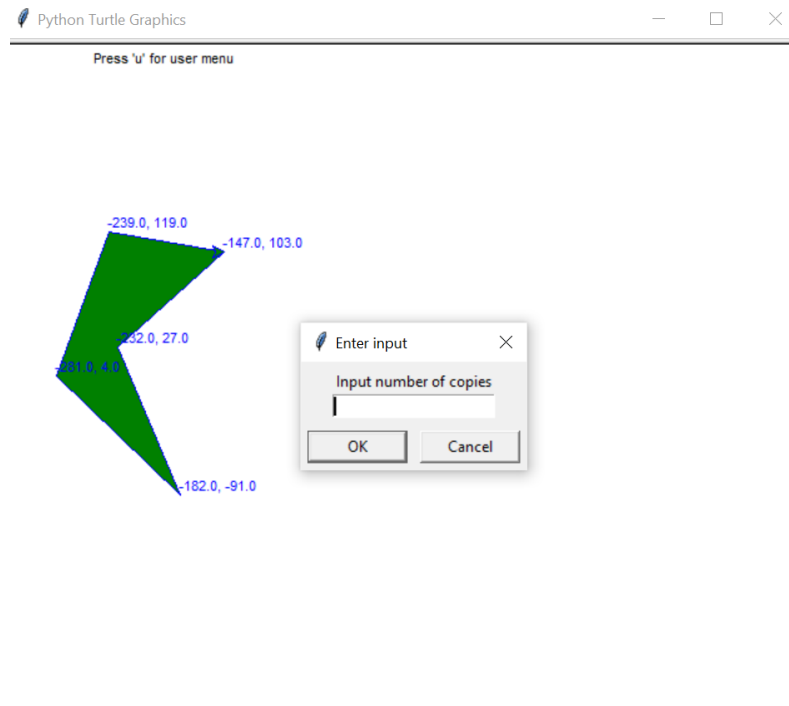
- (c) **Rotating Polygon:** Rotation is done by pressing “r” or entering into “polygon built” popup upon completion of a polygon. After entering angle of rotation, x and y values to rotate point about as prompted, the polygon will be rotated accordingly.



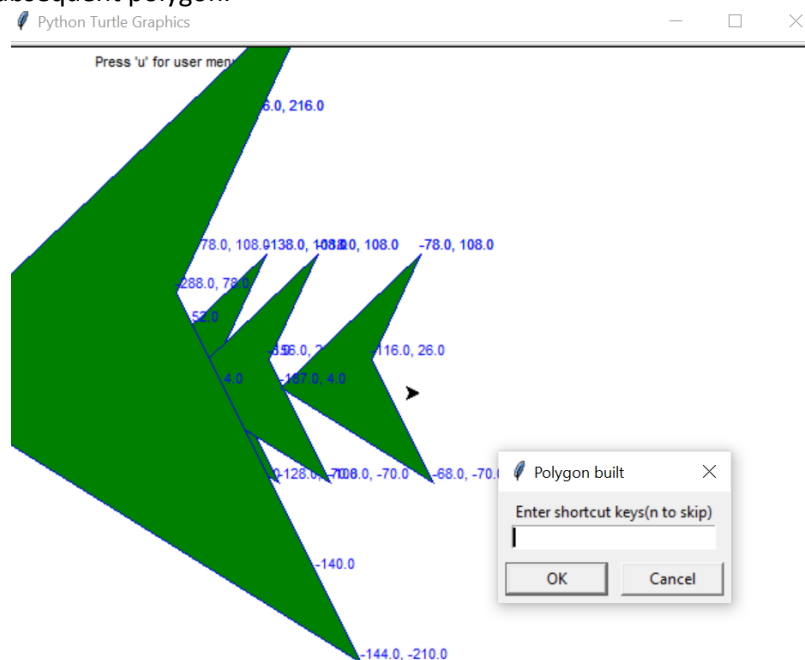
- (d) **Scaling Polygon:** Scale is done by pressing key “s” or entering into “polygon built” popup upon completion of a polygon. The polygon will be scaled as per the scale you input into the popup.

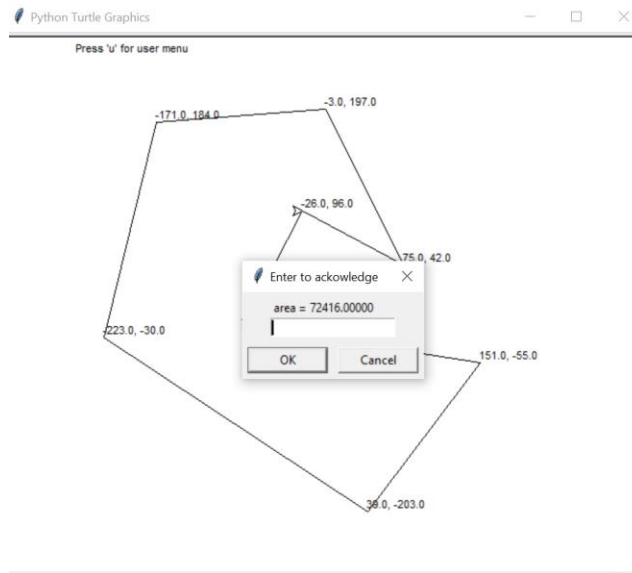


- (e) **Multiple Copies of Polygon:** When key “d” is pressed or entered into “polygon built” popup upon completion of a polygon, the user will be prompted for the number of copies. Next, user has to input “1” for linear duplication or “2” for rotating duplication.

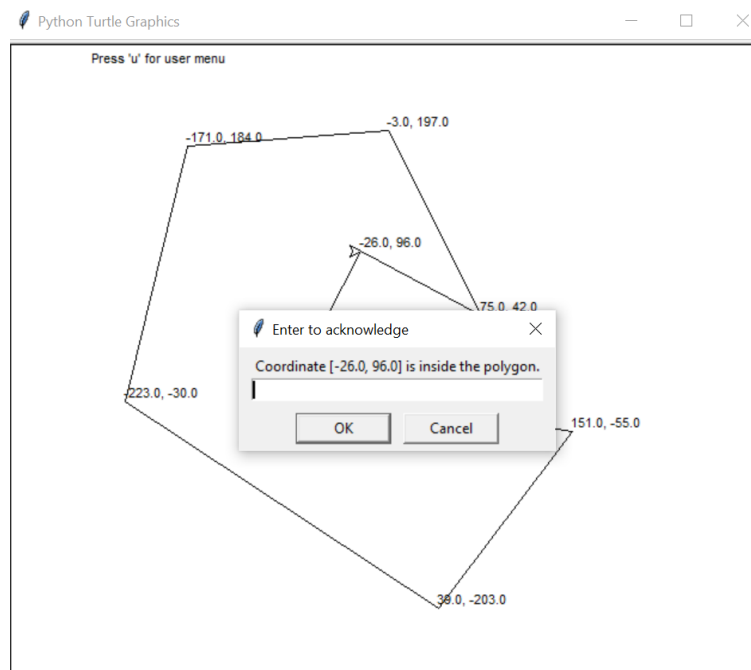


- (i) **Linear Duplication:** X and y distance from each other must be entered into the popups that appear. Each copy built, he will be prompted to input the scale of each subsequent polygon.

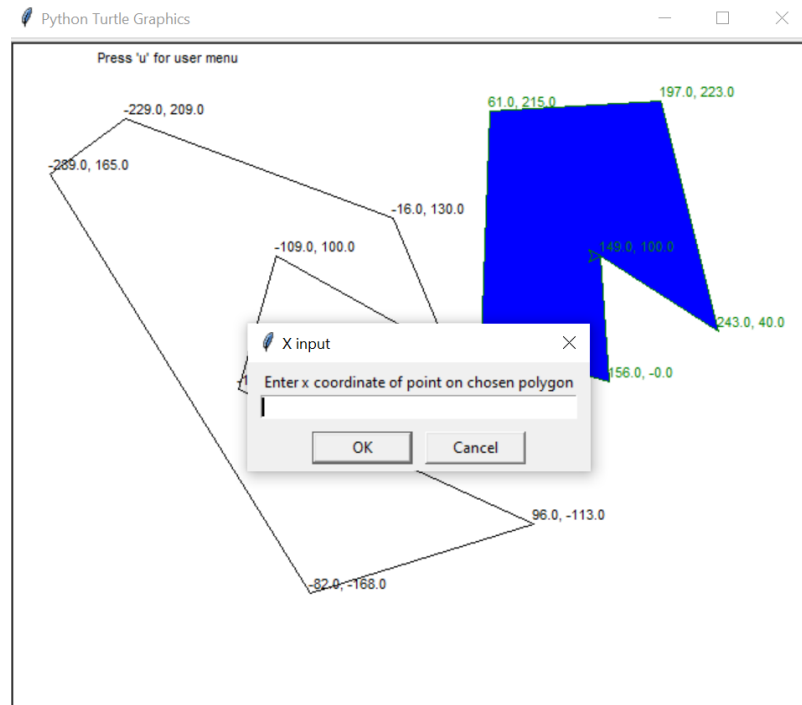




- (c) **Point Inclusion Test:** Press key “t” or entering into “polygon built” popup upon completion of a polygon. After entering x and y coordinates of point being tested, the app will return if point inside polygon or not.

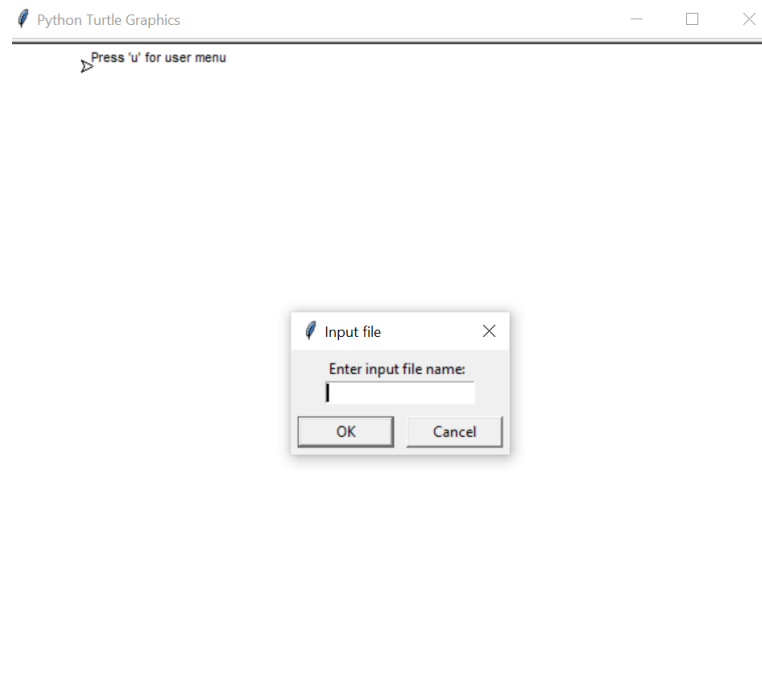


- (d) **Selecting a Polygon:** Press key “x” or entering into “polygon built” popup upon completion of a polygon. Afterwards, input x and y values into popups that appear.

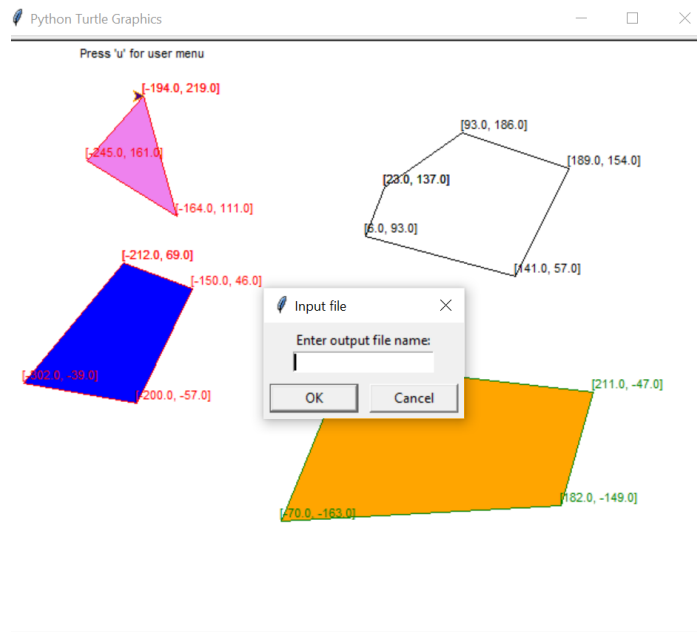


File Input/Output

- (a) **File Input:** By following prompts upon app startup or entering key “f” into “polygon built” popup, files can be read in from data file of name entered.

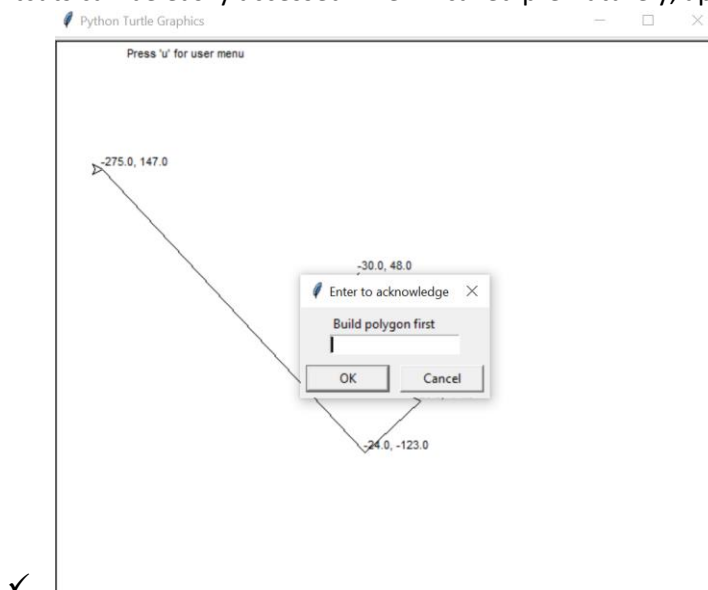


- (b) **File Output:** When satisfied, user can press “q” on main screen or in “polygon built” popup to quit the program. When program is quit, polygon data will be saved into data file of name you can specify.

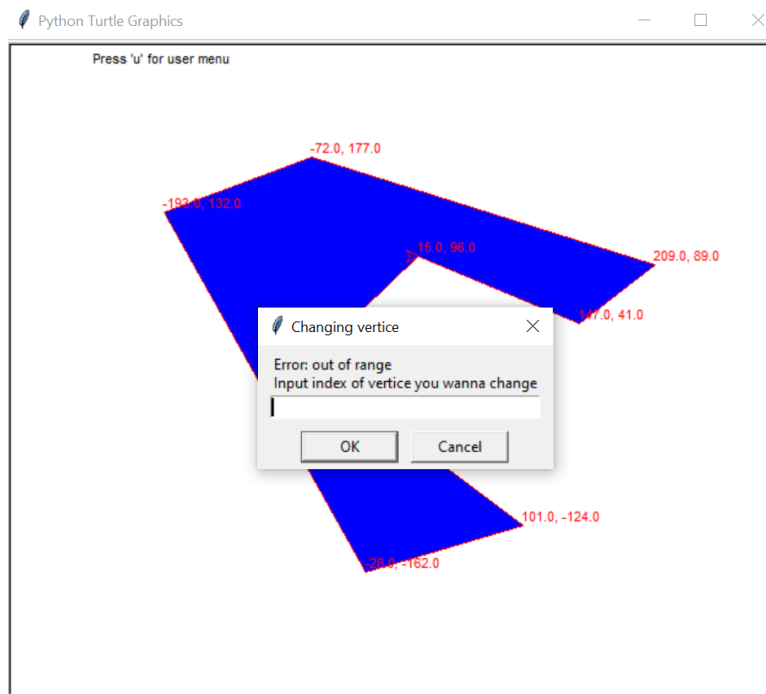


Strengths

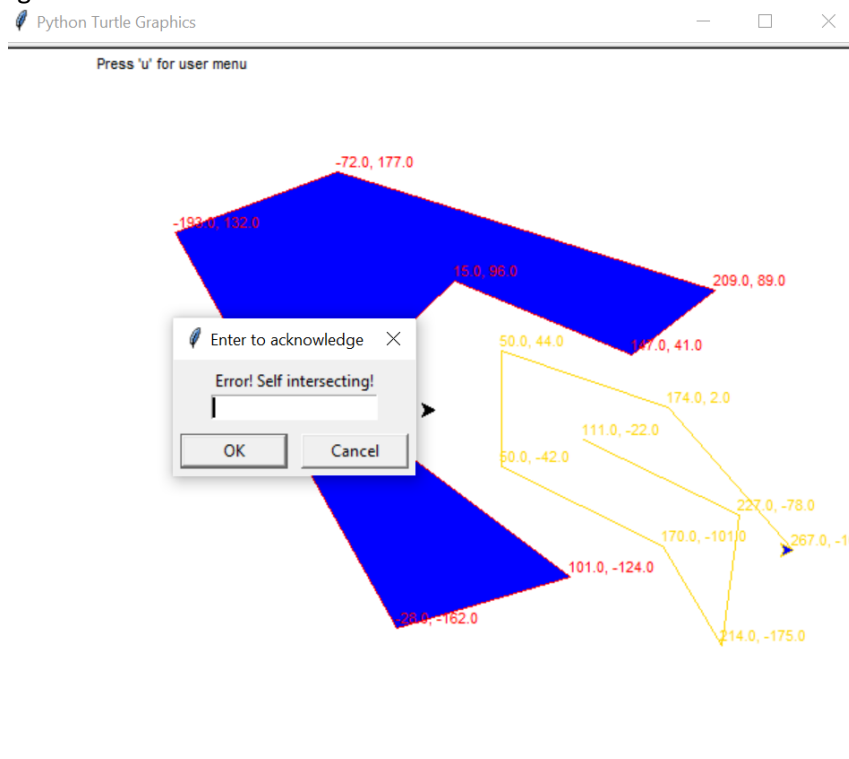
- ✓ Everything on one screen; no back and forth. Very user friendly, lots of popups to guide the user on what to do. If user in doubt, can press “u” to bring up user menu too, As clearly displayed in the top left hand corner of the screen.
- ✓ User can just press enter when prompted for pen and fill colour and that will produce a black pen colour and blank fill respectively. This saves the user a lot of time when prompted every single polygon
- ✓ After loading in polygon from file, can modify the polygons loaded, as well as add new ones.
- ✓ Shortcuts can be easily accessed. Even if called prematurely, app will just gently remind users.



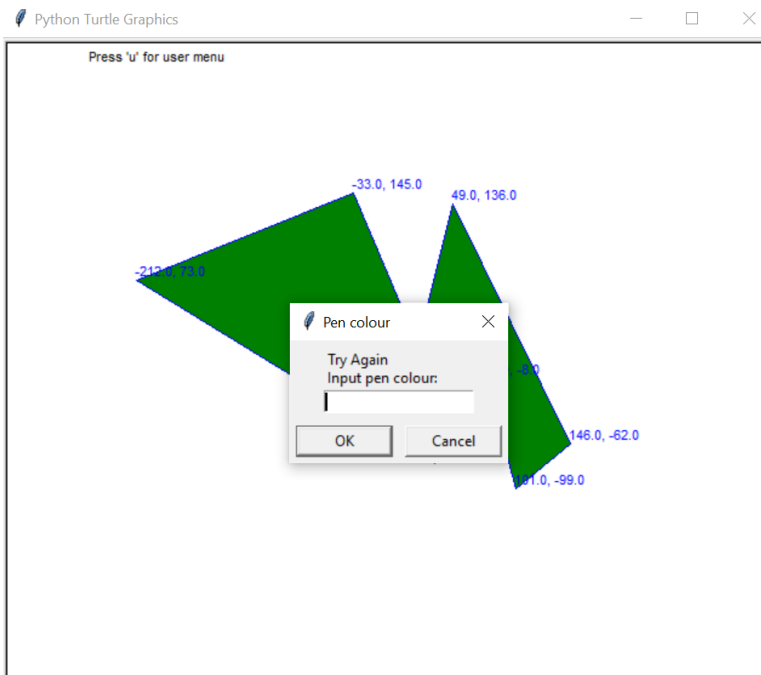
- ✓ No limit to number of edges on polygon. Can add until user is satisfied.
- ✓ Errors caught to the best of my ability. Even if the user messes up and inputs the wrong thing, the app will still work. If wrong keys are entered, the app will tell you what your error is.



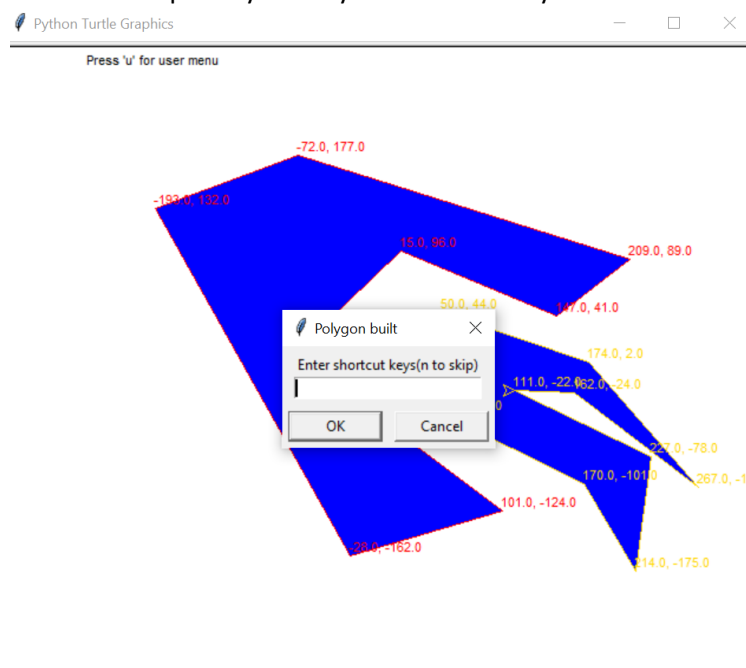
- ✓ Can switch between mouse clicks and keying in inputs when creating polygon.
- ✓ Checks in real time if self intersecting and will block you from doing so immediately. Works with modifying too.



- ✓ Even when modifying, self intersecting is still blocked; users prevented from modifying to such polygons.
- ✓ In fact, most things are real time. Will prompt errors immediately when mistakes are made. Will even tell users what the error is. In this example, even if gibberish is entered into pen colour, the app will immediately flag the error and request the user correct it on the spot, in real time. This prevents the user from wasting time entering fill colour before being told his pen colour is wrong.



- ✓ When polygon built, analytical tools/modification prompts immediately, keeps prompting until user satisfied. Can skip easily if analysis not necessary.



- ✓ Convenient reading and storing of data from and into a single text file, of name you can specify.


```

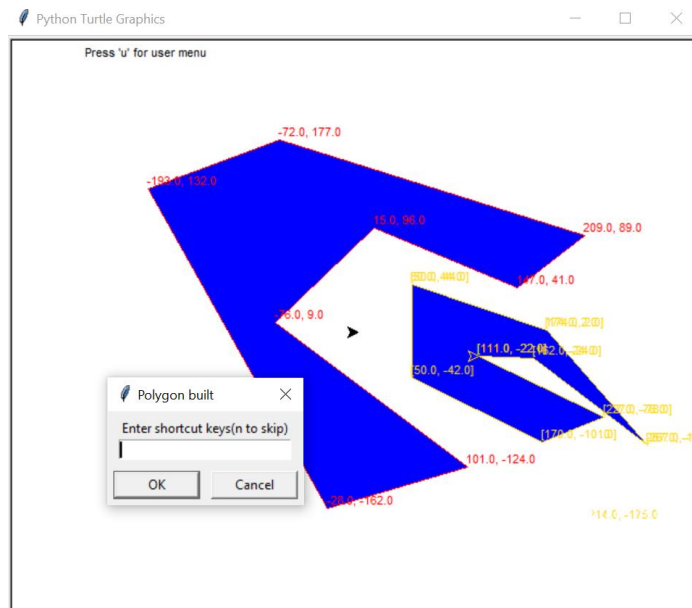
a - Notepad
File Edit Format View Help
[23.0, 137.0]
[93.0, 186.0]
[189.0, 154.0]
[141.0, 57.0]
[6.0, 93.0]
[23.0, 137.0]
N
[-212.0, 69.0]
[-302.0, -39.0]
[-200.0, -57.0]
[-150.0, 46.0]
[-212.0, 69.0]
N
[-12.0, -22.0]
[-70.0, -163.0]
[182.0, -149.0]
[211.0, -47.0]
[-12.0, -22.0]
N
[-194.0, 219.0]
[-245.0, 161.0]
[-164.0, 111.0]
[-104.0, 710.0]

```

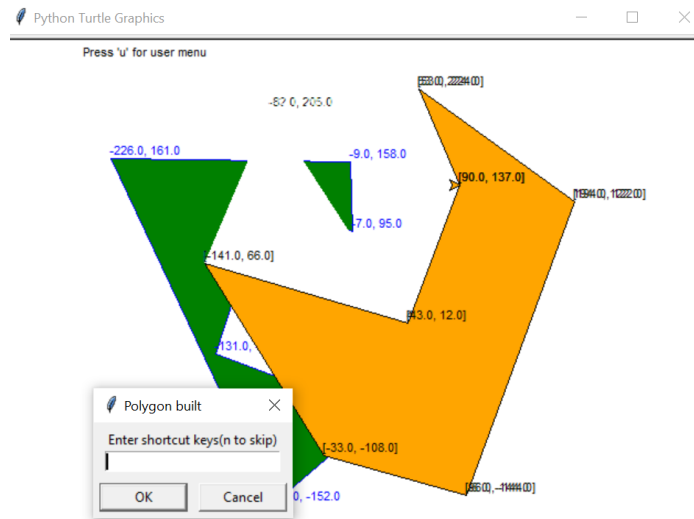
- ✓ Most of the code are set up with define functions; easy to call and reuse, shortening code considerably.
- ✓ The data file provided was 100% generated by my own code.

Weaknesses

- Turtle bug that takes you off the drawing screen when text/num inputs are entered. Must tab to reenter screen.
- When modifying polygons, the “deleter” function to cover does not cover the old polygon in white perfectly due to a turtle bug. The vertex points are left behind as turtle does not redraw the text at the exact same location.



- Could possibly create multiple turtle screens and directly clear that screen to fix such an error. However, I was unable to figure out and clearing on the same screen resets the entire turtle such that clicks and other operations no longer work. Also, other polygons will be removed from the screen too which is not what we want. Given more time, I could have worked on it more
- If you draw polygons over each other, there will be a white fill of the old shape of the polygon if modification done, due to the “deleter” function which redraws old polygon in white. Not a foolproof way redrawing the shape but better than nothing



- Buttons; user interface could be improved that way; less confusion over shortcuts. Given more time, I would have added clickable buttons to make app interaction better.
- When creating multiple polygons, have to click once to initialise. This was the compromise made to keep my click always working; a trigger which I named “option” was used to check if polygon was completed, to make sure polygon data stored properly.
 - Also, if you want to save your last polygon, you have to click once before pressing “q” to call quit function.
- My screen does not change size to fit the polygon. This could perhaps be done with some sort of scaling for the default size of the turtle screen, which I would do if I had more time.
- The scale when working duplicating is weird too. When scaling, it moves the polygon such that the distance or angle between the polygons are no longer as specified. Given time, I would bind one corner of the polygon to a the specified distance away from original polygon