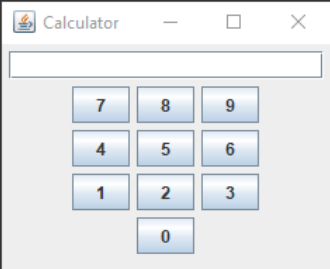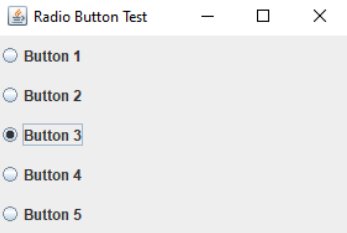Test case #1. Testing GUI provided in Project 1 handout.

```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
---Parsed flow layout for frame
---Parsed textfield. Size: 20
---Parsed grid layout for panel. (4, 3, 5, 5)
---Parsed panel
---Parsed button "7"
---Parsed button "8"
---Parsed button "9"
---Parsed button "4"
---Parsed button "5"
---Parsed button "6"
---Parsed button "1"
---Parsed button "2"
---Parsed button "3"
---Parsed label ""
---Parsed button "0"
---Parsed widgets
-----GUI has been succesfully parsed-----
```

Calculator window:
```
Calculator  — □ ✕
[                    ]
  7   8   9
  4   5   6
  1   2   3
      0
```

Calculator.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (250, 200) Layout Flow:
        Textfield 20;
        Panel Layout Grid(4, 3, 5, 5):
                Button "7";
                Button "8";
                Button "9";
                Button "4";
                Button "5";
                Button "6";
                Button "1";
                Button "2";
                Button "3";
                Label "";
                Button "0";
        End;
End.
```

Test case #2. Showing a GUI with radio buttons and how they are grouped. Also showing the ability to parse regardless of spaces and parse a grid layout with only width and height.
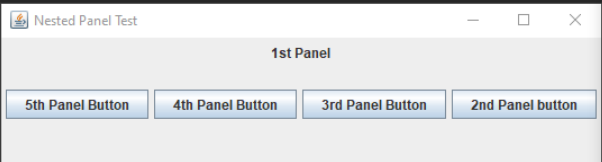
```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
---Parsed grid layout for frame. (5, 1) No gaps.
---Parsed radio button "Button 1"
---Parsed radio button "Button 2"
---Parsed radio button "Button 3"
---Parsed radio button "Button 4"
---Parsed radio button "Button 5"
---Parsed radio button(s)
---Parsed widgets
-----GUI has been succesfully parsed-----
```

Radio Button Test window:
```
Radio Button Test  — □ ✕
○ Button 1
○ Button 2
◉ Button 3
○ Button 4
○ Button 5
```

RadioButton.txt - Notepad
File Edit Format View Help
```
Window   "Radio Button Test" (300, 200) Layout Grid(5, 1):
    Group
      Radio"Button 1";
      Radio "Button 2"      ;
      Radio      "Button 3";
      Radio   "Button 4";
      Radio   "Button 5";
    End;
End.
```

Test case #3. Parsing a GUI with nested panels.

```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
---Parsed flow layout for frame
---Parsed label "1st Panel"
---Parsed flow layout for panel
---Parsed panel
---Parsed flow layout for panel
---Parsed panel
---Parsed flow layout for panel
---Parsed panel
---Parsed flow layout for panel
---Parsed panel
---Parsed button "5th Panel Button"
---Parsed button "4th Panel Button"
---Parsed button "3rd Panel Button"
---Parsed button "2nd Panel button"
---Parsed widgets
-----GUI has been succesfully parsed-----
```

Nested Panel Test window:
```
Nested Panel Test  — □ ✕
                1st Panel
[5th Panel Button] [4th Panel Button] [3rd Panel Button] [2nd Panel button]
```

NestedPanel.txt - Notepad
File Edit Format View Help
```
Window "Nested Panel Test" (550, 150) Layout Flow:
    Label "1st Panel";
    Panel Layout Flow:
       Panel Layout Flow:
         Panel Layout Flow:|
           Panel Layout Flow:
             Button "5th Panel Button";
           End;
           Button "4th Panel Button";
         End;
         Button "3rd Panel Button";
       End;
       Button "2nd Panel button";
    End;
End.
```

Test case #4. Can't parse the title with a missing quotation mark.

```
run:
!!!Failed to parse window
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 4 seconds)
```

Fail1.txt - Notepad
File Edit Format View Help
```
Window Calculator" (200, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
```

Test case #5. Can't parse window with missing parentheses.

```
run:
---Parsed window title
!!!Failed to parse window
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 4 seconds)
```

Fail2.txt - Notepad
File Edit Format View Help
```
Window "Calculator" 200, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
```

Test case #6. Can't parse window with missing number.

```
run:
---Parsed window title
!!!Failed to parse window size
!!!Failed to parse window
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 4 seconds)
```

Fail3.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
Textfield 20;
```

Test case #7. Can't parse layout (case sensitive).

```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
!!Failed to parse layout
!!!Failed to parse window
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 4 seconds)
```

Fail4.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (250, 200) Layout FloW:
Panel Layout Grid(4, 3, 5, 5):
Textfield 20;
Button "7";
Button "8";
```

Test case #8. Can't parse GUI without "End." to finish panel.

```
run:
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 5 seconds)
```

Fail5.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (250, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
Textfield 20;
Button "7";
End;
```

Test case #9. Can't parse GUI without "End;"

```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
---Parsed flow layout for frame
---Parsed grid layout for panel. (4, 3, 5, 5)
---Parsed panel
---Parsed textfield. Size: 20
---Parsed button "7"
---Parsed button "0"
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 4 seconds)
```

Fail6.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (250, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
Textfield 20;
Button "7";
Button "0";
End.
```

Test case #10. Can't parse components with missing semi-colons.

```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
---Parsed flow layout for frame
---Parsed grid layout for panel. (4, 3, 5, 5)
---Parsed panel
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 4 seconds)
```

Fail7.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (250, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
Textfield 20
Button "7"|
End;
End.
```

```
run:
---Parsed window title
---Parsed window size
---Window parsed successfully
---Parsed flow layout for frame
---Parsed grid layout for panel. (4, 3, 5, 5)
---Parsed panel
---Parsed textfield. Size: 20
!!!Failed to parse GUI
BUILD SUCCESSFUL (total time: 17 seconds)
```

Fail8.txt - Notepad
File Edit Format View Help
```
Window "Calculator" (250, 200) Layout Flow:
Panel Layout Grid(4, 3, 5, 5):
Textfield 20;
Button "7"
Button "0";|
End;
End.
```

This project helped me to learn more about recursive descent. While I'm still not sure if I completely grasp it or if my program used recursion as much as it should have, I can say I'm not completely lost. I started the project with each method having a string passed as a parameter. This worked fine when I was manually calling each method to form the GUI (stuff like parseWindow("Window "Calculator" (250, 200) Layout Flow:")), but when it came time for the GUI to create itself, I ran into a few problems. That's when I started looking online for help and I found the program from Barrett Otte. After reviewing his code, I saw a few things that would make my code run more smoothly. The first was to turn the file into an arrayList of each line and using currentComponent to keep track of what line is being parsed helped immensely. Our arraylists differ greatly, mine is simply each line from the file, but his is a cleanly tokenized one that breaks up each line for parsing. The second was the isFrame Boolean that helped clear up how the program decided where to add each object. Next, my recursive methods for parsing widgets/radio buttons were quite messy so I borrowed Barrett's implementations. Lastly, I used his example text files (RadioButton and NestedPanel) for some of my test cases.