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Continuing Education Course #365
Python Programming for Engineers - Part 4:
Graphical User Interfaces II

1. A graphical user interface is:

○ a. an interface that enables a user to interact with a computer program by typing special commands into a command line.

○ b. a special software that enables a programmer to interact with an electronic device by calling special commands and functions.

○ c. an interface that enables a user to interact with a computer program through visual indications and graphical objects and controls such as click buttons, checkboxes, textboxes, etc., etc.

2. Some of the popular packages used to build Python graphical user interfaces include:

○ a. tkinter

○ b. JxPython

○ c. GUIPython

3. The main principle behind GUI development in Python is:

○ a. to create widgets and write code that enables the user to manipulate a root window

○ b. to create a main window, add widgets to the main window and write code to control and manipulate the widgets.

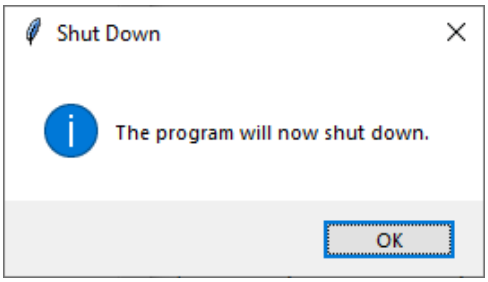
○ c. to write code for widgets and then write code for functions that enable the user to modify the main window.

4. Given the code,

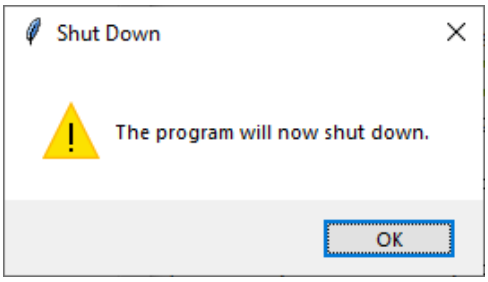
```
def func1( ):
    tkMsgbox1 = Msgbox.showinfo('Welcome Page','Please proceed to the application.')
def func2( ):
    tkMsgbox2 = Msgbox.showwarning('Shut Down','The program will now shut down.')
    root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')

label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on EXIT. The message box that appears is:

○ a.



○ b.



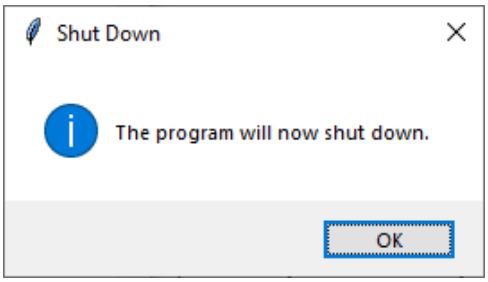
○ c. None of the above.

5. Given the code,

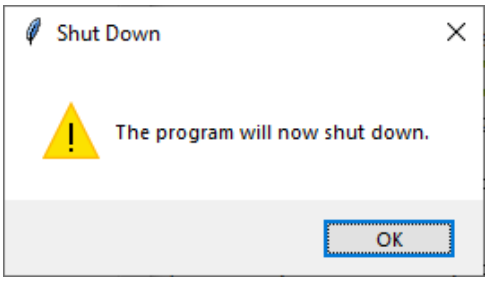
```
def func1( ):
    tkMsgbox1 = Msgbox.showinfo('Welcome Page','Please proceed to the application.')
def func2( ):
    tkMsgbox2 = Msgbox.showerror('Shut Down','The program will now shut down.')
    root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')

label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on EXIT. The message box that appears is:

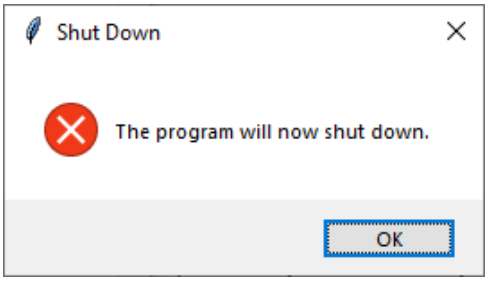
○ a.



○ b.



○ c.

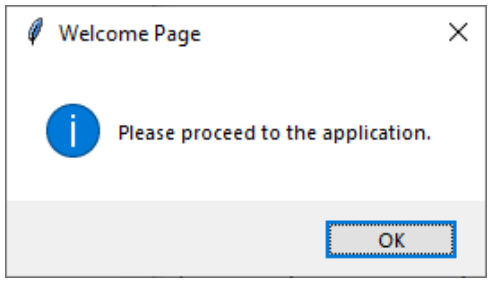


6. Given the code,

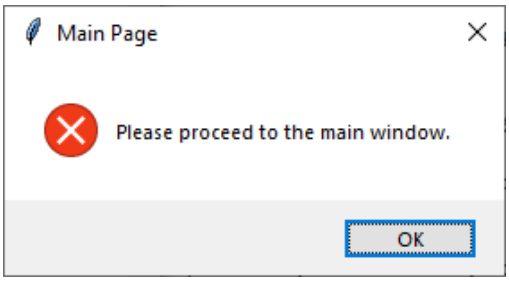
```
def func1( ):
    tkMsgbox1 = Msgbox.showinfo('Main Page','Please proceed to the main window.')
def func2( ):
    tkMsgbox2 = Msgbox.showwarning('Shut Down','The program will now shut down.')
    root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')

label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on CONTINUE. The message box that appears is:

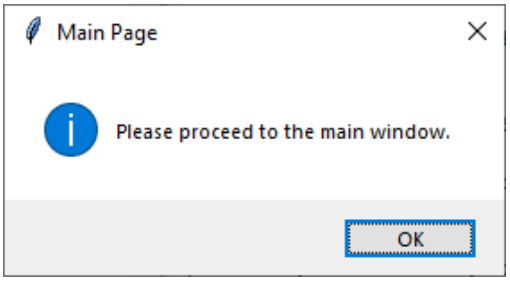
○ a.



○ b.



○ c.

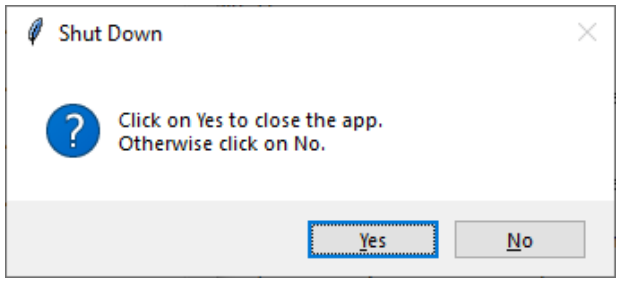


7. Given the code,

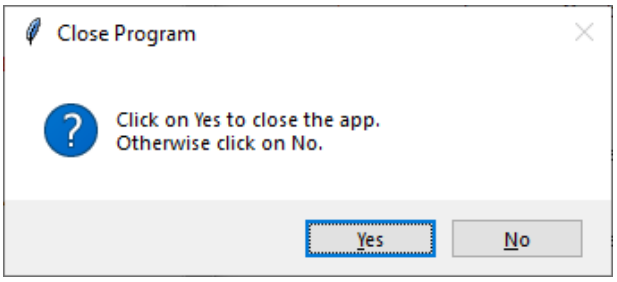
```
 def func1( ):
    tkMsgbox1 = Msgbox.showinfo('Main Page','Please proceed to the main window.')
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Shut Down','Click on Yes to close the app.\
                                \nOtherwise click on No.')
    if tkMsgbox2 == tk.TRUE :
        root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')

label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on EXIT. The message box that appears is:

○ a.



○ b.



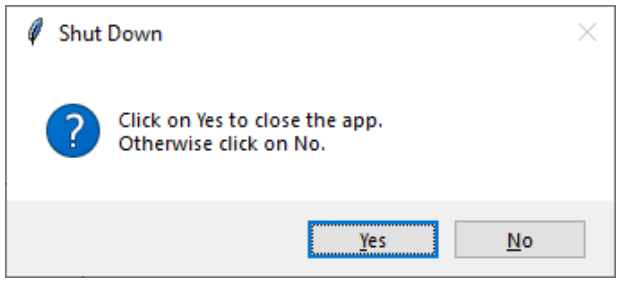
○ c. None of the above.

8. Given the code,

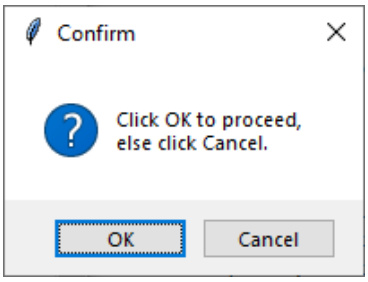
```
def func1( ):
    tkMsgbox1 = Msgbox.askokcancel('Confirm','Click OK to proceed, \nelse click Cancel.

    if tkMsgbox1 == tk.TRUE:
        tkMsgbox4 = Msgbox.showinfo('Welcome', 'Welcome to main window')

def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Shut Down','Click on Yes to close the app.\
                                \nOtherwise click on No.')
    if tkMsgbox2 == tk.TRUE:
        root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')

label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on CONTINUE. The message box that appears is:

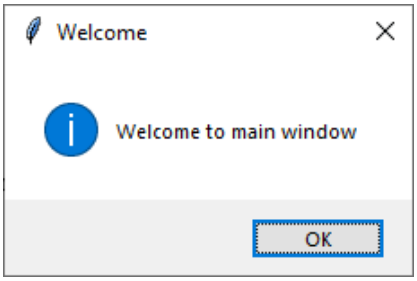
○ a.



○ b.



○ c.

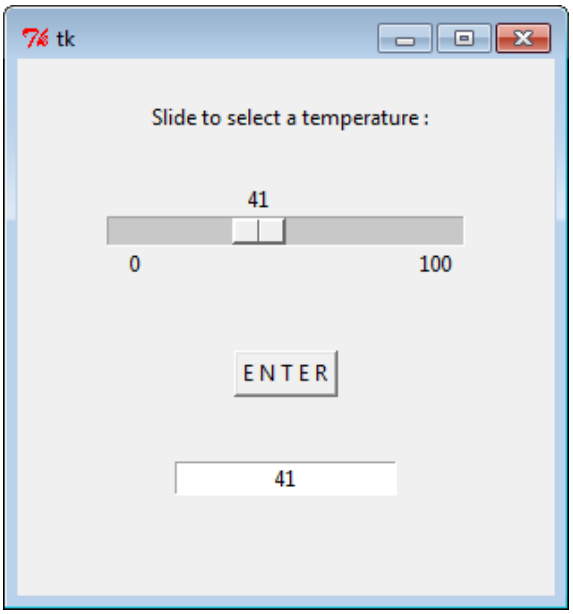


9. Given the code for a slider application,

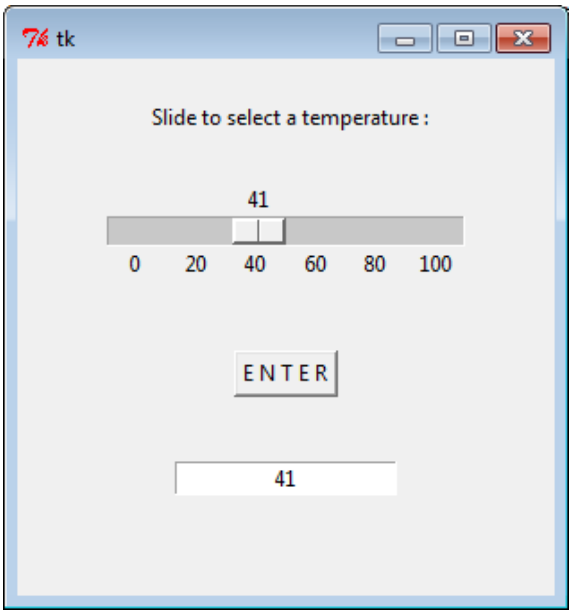
```
def func1( ):
    entry.delete(0, 3)
    entry.insert(0, scale.get( ))

import tkinter as tk
root = tk.Tk( )
root.geometry('300x300')

label1 = tk.Label(root, height = 4, text = '  Slide to select a temperature :')
scale = tk.Scale(root, from_ = 0, to = 100, orient = tk.HORIZONTAL,\
                 length = 200)
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')
entry = tk.Entry(root, text = ' ', justify = tk.CENTER)
label4 = tk.Label(root, height = 2, text = '')

label1.pack( )
scale.pack( )
label2.pack( )
button.pack( )
label3.pack( )
entry.pack( )
label4.pack( )

root.mainloop( )
```

The uses picks a temperature and clicks on the ENTER Button. The slider application appears as:

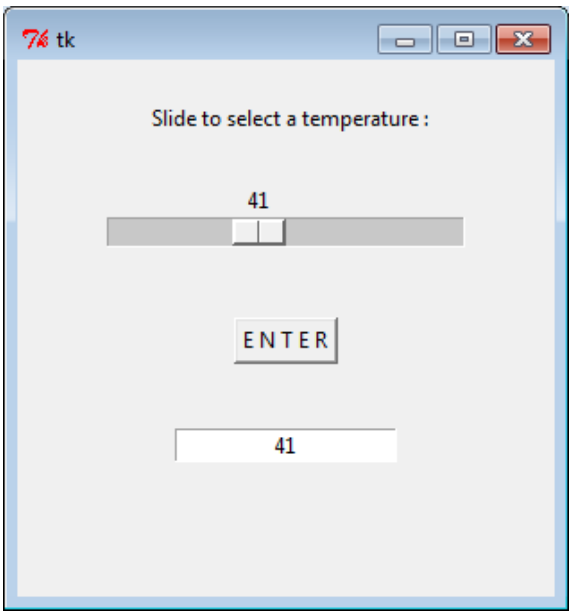
○ a.


tk
Slide to select a temperature :
41
0
100
ENTER
41

○ b.


tk
Slide to select a temperature :
41
0
20
40
60
80
100
ENTER
41

○ c.

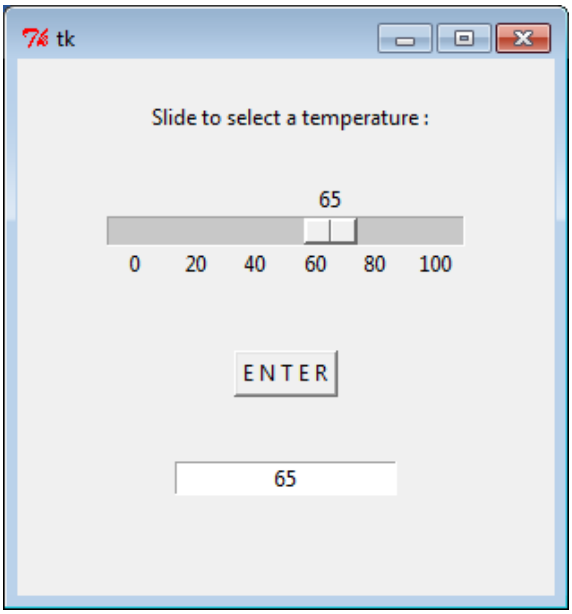

tk
Slide to select a temperature :
41
ENTER
41

10. Given the code for a slider application,

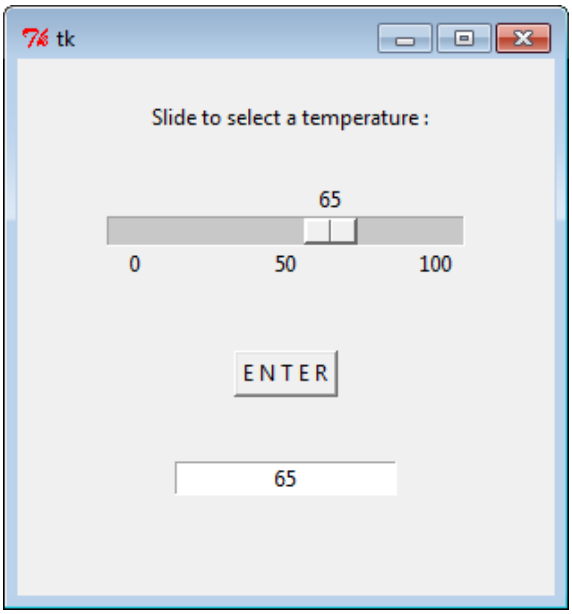
```
def func1( ):
    entry.delete(0, 3)
    entry.insert(0, scale.get( ))

import tkinter as tk
root = tk.Tk( )
root.geometry('300x300')

label1 = tk.Label(root, height = 4, text = '  Slide to select a temperature :')
scale = tk.Scale(root, from_ = 0, to = 100, orient = tk.HORIZONTAL,\
                 length = 200, tickinterval = 20)
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')
entry = tk.Entry(root, text = ' ', justify = tk.CENTER)
label4 = tk.Label(root, height = 2, text = '')

label1.pack( )
scale.pack( )
label2.pack( )
button.pack( )
label3.pack( )
entry.pack( )
label4.pack( )

root.mainloop( )
```

The uses picks a temperature and clicks on the ENTER Button. The slider application appears as:

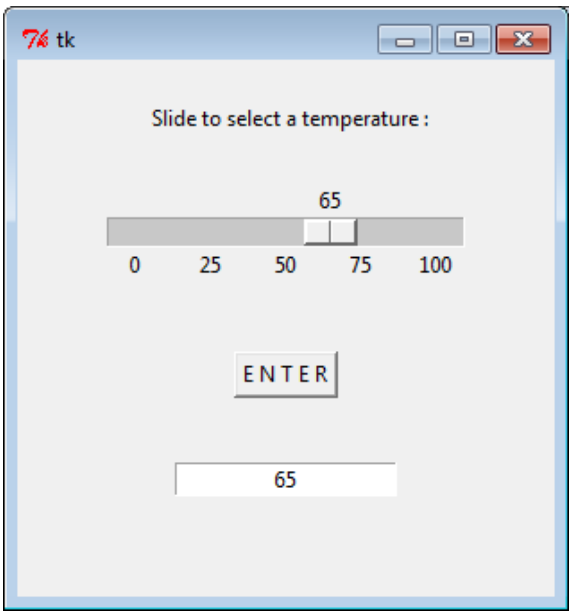
○ a.


tk
Slide to select a temperature :
65
0 20 40 60 80 100
ENTER
65

○ b.


tk
Slide to select a temperature :
65
0 50 100
ENTER
65

○ c.

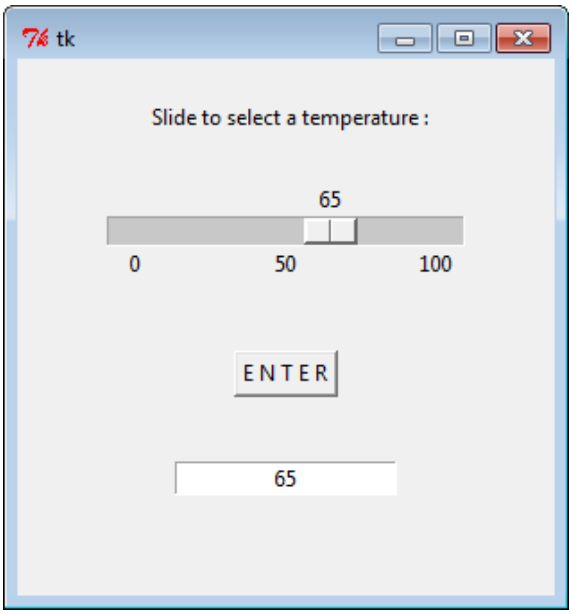

tk
Slide to select a temperature :
65
0 25 50 75 100
ENTER
65

11. Given the code for a slider application,

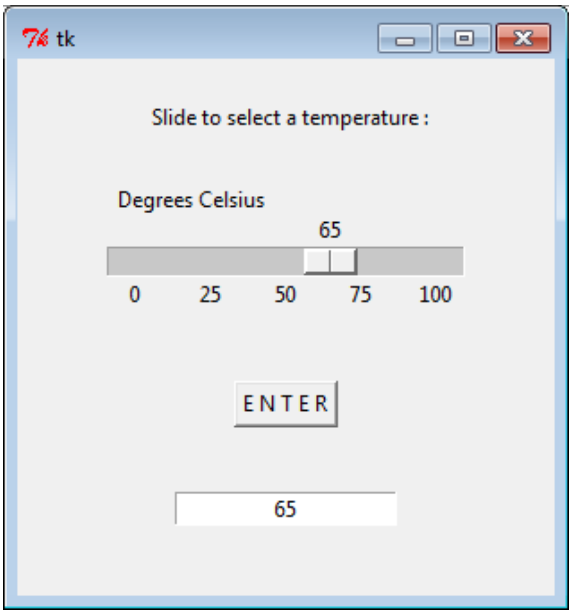
```
def func1( ):
    entry.delete(0, 3)
    entry.insert(0, scale.get())

import tkinter as tk
root = tk.Tk( )
root.geometry('300x300')

label1 = tk.Label(root, height = 4, text = '  Slide to select a temperature :')
scale = tk.Scale(root, from_ = 0, to = 100, orient = tk.HORIZONTAL,\
                 length = 200, tickinterval = 25, label = 'Degrees Celsius')
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')
entry = tk.Entry(root, text = ' ', justify = tk.CENTER)
label4 = tk.Label(root, height = 2, text = '')

label1.pack( )
scale.pack( )
label2.pack( )
button.pack( )
label3.pack( )
entry.pack( )
label4.pack( )

root.mainloop( )
```

The user picks a temperature and clicks on ENTER. The slider application appears as:

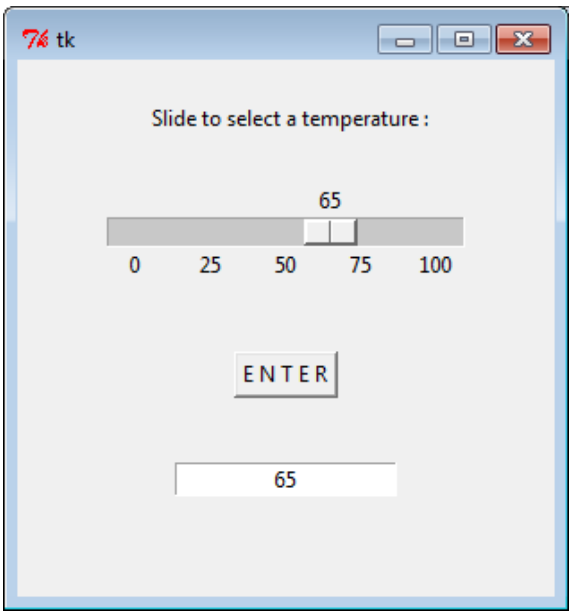
a.



b.



c.



12. The scrollbar widget is used

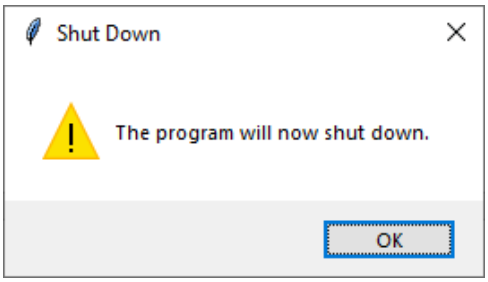
○ a. to give the capability of scrolling to other widgets such as Text, Listbox, etc.
○ b. to give the capability of scrolling to the main GUI window only
○ c. to give the capability of horizontal scrolling only to other widgets such as Text, Listbox, etc.

13. Given the code,

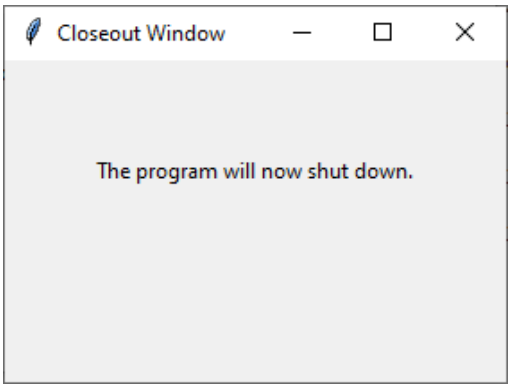
```
def func1( ):
    tkMsgbox1 = Msgbox.askyesno('Welcome Page','Would you like to proceed \
to the main page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Main Page')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the main app.')
        labeltop1.pack( )
        labeltop2.pack( )
def func2( ):
    tkMsgbox2 = Msgbox.showwarning('Shut Down','The program will now shut down.')
    root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')
root.title('Welcome Page')
label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on CONTINUE. On the tkMessageBox and the user clicks on Yes. The Toplevel that appears is:

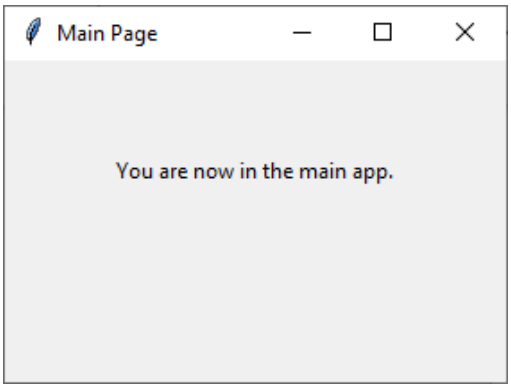
○ a.



○ b.



○ c.



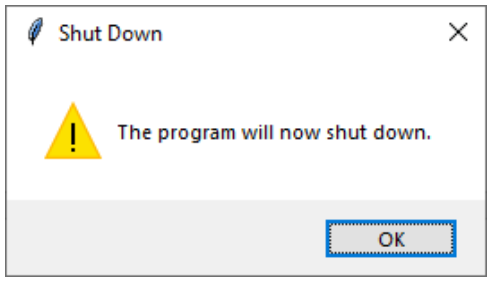
14. Given the code,

```
def func1( ):
    tkMsgbox1 = Msgbox.askyesno('Welcome Page','Would you like to proceed \
to the main page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Main Page')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the main app.')
        labeltop1.pack( )
        labeltop2.pack( )
def func2( ):
    tkMsgbox2 = Msgbox.showwarning('Shut Down','The program will now shut down.')
    root.destroy( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x200')
root.title('Welcome Page')
label2 = tk.Label(root, height = 4, text = '  Click on a button to continue :')
button1 = tk.Button(root, text = 'C O N T I N U E', command = func1)
button2 = tk.Button(root, text = 'E X I T', command = func2)
```

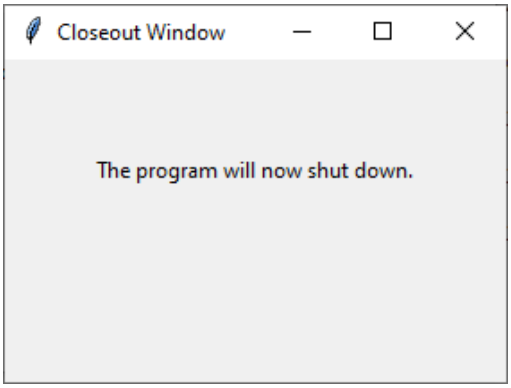
```
label3 = tk.Label(root, height = 2, text = '')

label2.grid(row = 0, column = 0, columnspan = 2)
button1.grid(row = 1, column = 1)
button2.grid(row = 1, column = 2)
label3.grid(row = 2, column = 0, columnspan = 3)

root.mainloop( )
```

The user clicks on EXIT, the Toplevel that appears is:

○ a.



○ b.



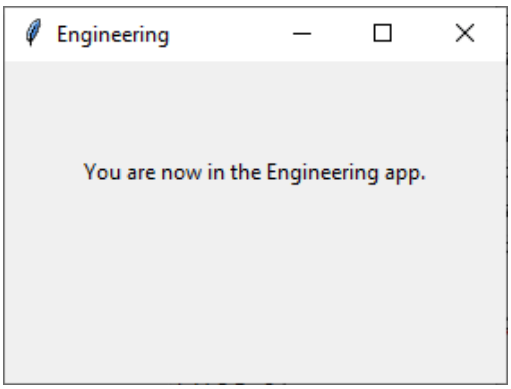
○ c. None of the above

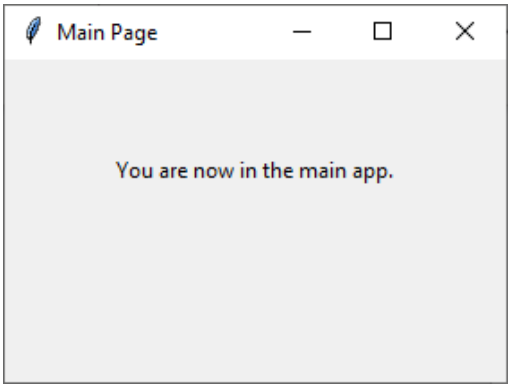
15. Given the code,

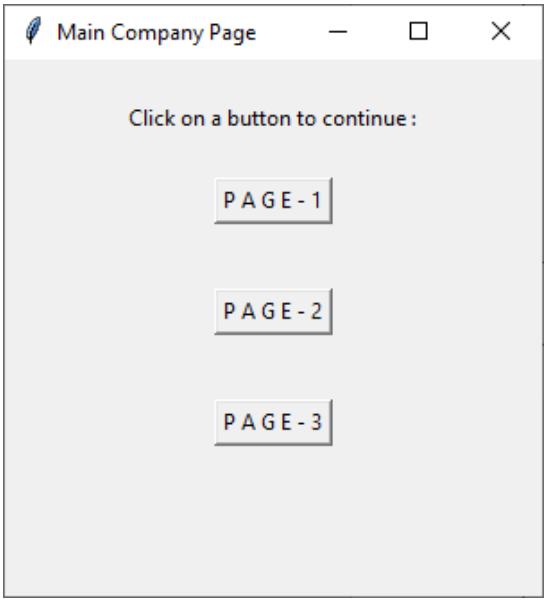
```
def func1( ):
    tkMsgbox1 = Msgbox.askyesno('Accounting','Would you like to proceed \
to the Accounting page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Accounting')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Accounting app.')
        labeltop1.pack( )
        labeltop2.pack( )
def func2( ):
    tkMsgbox1 = Msgbox.askyesno('Engineering','Would you like to proceed \
to the Engineering page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel()
        top.title('Engineering')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Engineering app.')
        labeltop1.pack( )
        labeltop2.pack( )
def func3( ):
```

```
    tkMsgbox1 = Msgbox.askyesno('Project Management','Would you like to proceed \
to the Project Management page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Project Management')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Project Management app.')
        labeltop1.pack( )
        labeltop2.pack( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x300')
root.title('Main Company Page')
label2 = tk.Label(root, height = 4, text = 'Click on a button to continue :')
button1 = tk.Button(root, text = 'P A G E - 1', command = func1)
button2 = tk.Button(root, text = 'P A G E - 2', command = func2)
button3 = tk.Button(root, text = 'P A G E - 3', command = func3)
label3 = tk.Label(root, height = 2, text = '')
label4 = tk.Label(root, height = 2, text = '')
label5 = tk.Label(root, height = 2, text = '')

label2.pack( )
button1.pack( )
label3.pack( )
button2.pack( )
label4.pack( )
button3.pack( )
label5.pack( )

root.mainloop( )
```

The user clicks on PAGE 2. On the tkMessageBox and the user clicks on Yes. The Toplevel that appears is:

a. 

b. 

c. 

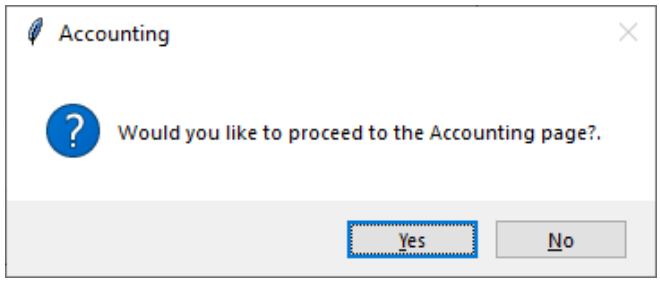
16. Given the code,

```
def func1( ):
    tkMsgbox1 = Msgbox.askyesno('Accounting','Would you like to proceed \
to the Accounting page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Accounting')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Accounting app.')
        labeltop1.pack( )
        labeltop2.pack( )
def func2( ):
    tkMsgbox1 = Msgbox.askyesno('Engineering','Would you like to proceed \
```

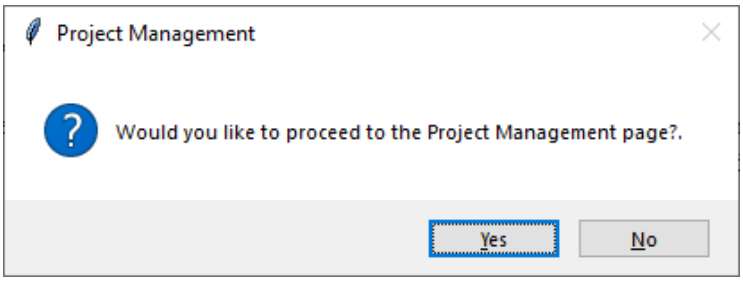
```
to the Engineering page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel()
        top.title('Engineering')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Engineering app.')
        labeltop1.pack( )
        labeltop2.pack( )
def func3( ):
    tkMsgbox1 = Msgbox.askyesno('Project Management','Would you like to proceed \
to the Project Management page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Project Management')
        top.geometry('280x180')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Project Management app.')
        labeltop1.pack( )
        labeltop2.pack( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x300')
root.title('Main Company Page')
label2 = tk.Label(root, height = 4, text = 'Click on a button to continue :')
button1 = tk.Button(root, text = 'P A G E - 1', command = func1)
button2 = tk.Button(root, text = 'P A G E - 2', command = func2)
button3 = tk.Button(root, text = 'P A G E - 3', command = func3)
label3 = tk.Label(root, height = 2, text = '')
label4 = tk.Label(root, height = 2, text = '')
label5 = tk.Label(root, height = 2, text = '')

label2.pack( )
button1.pack( )
label3.pack( )
button2.pack( )
label4.pack( )
button3.pack( )
label5.pack( )

root.mainloop( )
```

The user clicks on PAGE 3. The tkMessageBox that appears is:

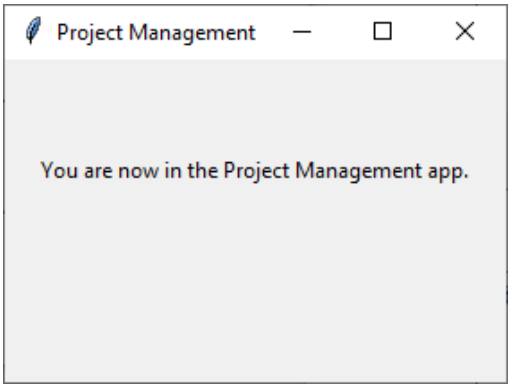
○ a.



○ b.



○ c.



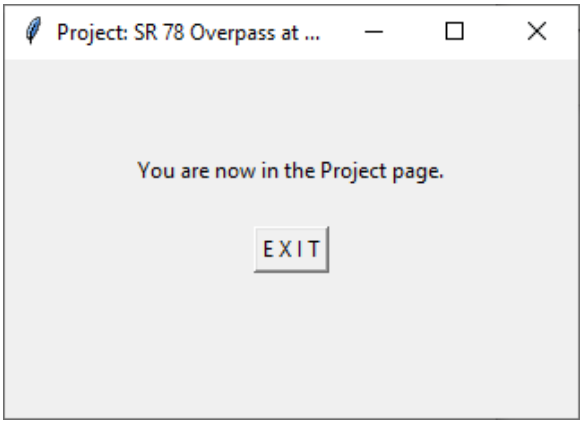
17. Given the code,

```
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Exit','Would you like to close \
the Project window only?')
    if tkMsgbox2 == tk.TRUE:
        top.destroy( )
    elif tkMsgbox2 == tk.FALSE:
        tkMsgbox3 = Msgbox.showinfo('Exit','The Company app will now shut down.\
\nGood Bye.')
        root.destroy( )

def func1( ):
    global top
    tkMsgbox1 = Msgbox.askyesno('Project','Would you like to proceed \
to the Project page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Project: SR 78 Overpass at Mill St.')
        top.geometry('320x200')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Project page.')
        labeltop3 = tk.Label(top, text = ' ')
        button = tk.Button(top, text = 'E X I T', command = func2)
        labeltop1.pack( )
        labeltop2.pack( )
        labeltop3.pack( )
        button.pack( )

import tkinter as tk
```

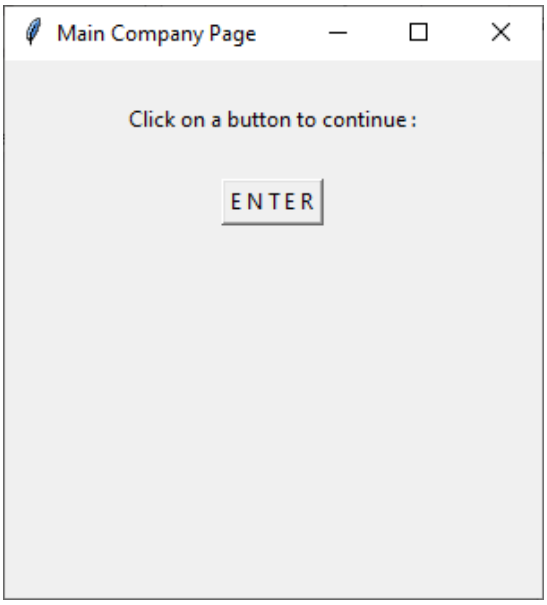
```
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x300')
root.title('Main Company Page')
label2 = tk.Label(root, height = 4, text = 'Click on a button to continue :')
button1 = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')

label2.pack( )
button1.pack( )
label3.pack( )

root.mainloop( )
```

The user clicks on ENTER. On the tkMessageBox the user clicks on Yes. The Toplevel that appears is:

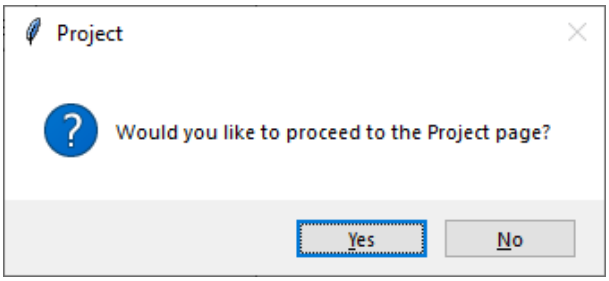
○ a.



○ b.



○ c.



18. Given the code,

```
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Exit','Would you like to close \
the Project window only?')
    if tkMsgbox2 == tk.TRUE:
        top.destroy( )
    elif tkMsgbox2 == tk.FALSE:
        tkMsgbox3 = Msgbox.showinfo('Exit','The Company app will now shut down.\
\nGood Bye.')
        root.destroy( )

def func1( ):
    global top
    tkMsgbox1 = Msgbox.askyesno('Project','Would you like to proceed \
to the Project page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Project: SR 78 Overpass at Mill St.')
        top.geometry('320x200')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Project page.')
        labeltop3 = tk.Label(top, text = ' ')
        button = tk.Button(top, text = 'E X I T', command = func2)
        labeltop1.pack( )
        labeltop2.pack( )
        labeltop3.pack( )
        button.pack( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x300')
root.title('Main Company Page')
label2 = tk.Label(root, height = 4, text = 'Click on a button to continue :')
button1 = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')

label2.pack( )
button1.pack( )
label3.pack( )

root.mainloop( )
```

The user clicks on ENTER. On the tkMessageBox the user clicks on Yes. The Toplevel opens. On the Toplevel, the user clicks on EXIT. On the tkMessageBox the user clicks on Yes. What happens next?

- ○ a. The root window closes.
- ○ b. The Toplevel window closes
- ○ c. All of the above

19. Given the code,

```
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Exit','Would you like to close \
the Project window only?')
    if tkMsgbox2 == tk.TRUE:
        top.destroy( )
```

```
    elif tkMsgbox2 == tk.FALSE:
        tkMsgbox3 = Msgbox.showinfo('Exit','The Company app will now shut down.\
\nGood Bye.')
        root.destroy( )

def func1( ):
    global top
    tkMsgbox1 = Msgbox.askyesno('Project','Would you like to proceed \
to the Project page?')
    if tkMsgbox1 == tk.TRUE:
        top = tk.Toplevel( )
        top.title('Project: SR 78 Overpass at Mill St.')
        top.geometry('320x200')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = 'You are now in the Project page.')
        labeltop3 = tk.Label(top, text = ' ')
        button = tk.Button(top, text = 'E X I T', command = func2)
        labeltop1.pack( )
        labeltop2.pack( )
        labeltop3.pack( )
        button.pack( )

import tkinter as tk
from tkinter import messagebox as Msgbox

root = tk.Tk( )
root.geometry('300x300')
root.title('Main Company Page')
label2 = tk.Label(root, height = 4, text = 'Click on a button to continue :')
button1 = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')

label2.pack( )
button1.pack( )
label3.pack( )

root.mainloop( )
```

The user clicks on ENTER. On the tkMessageBox the user clicks on Yes. The Toplevel opens. On the Toplevel, the user clicks on EXIT. On the tkMessageBox the user clicks on No. What happens next?

- ○ a. The root window closes.
- ○ b. The Toplevel window closes
- ○ c. All of the above

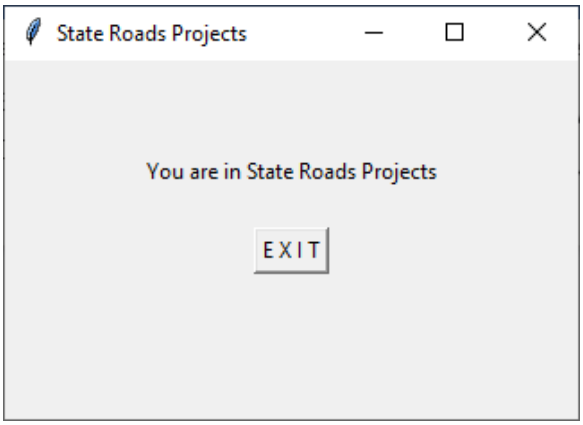
20. Given the code,

```
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Exit','Would you like to close \
the current window only?')
    if tkMsgbox2 == tk.TRUE:
        top.destroy( )
    elif tkMsgbox2 == tk.FALSE:
        tkMsgbox3 = Msgbox.showinfo('Exit','The Company app will now shut down.\
\nPlease check back often for project updates.')
        root.destroy( )

def func1( ):
    global combolist
    if combo.get( ) in combolist:
        if combo.get( ) == 'Interstates':
```

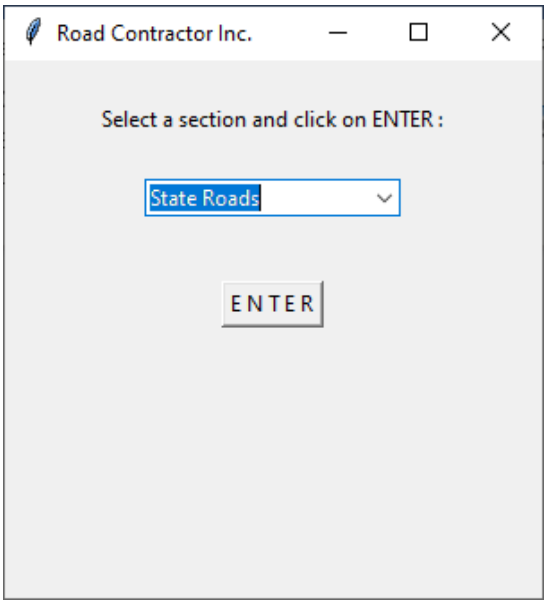
```
            titlec = 'Interstate Projects'
        elif combo.get( ) == 'Interchanges':
            titlec = 'Interchange Projects'
        elif combo.get( ) == 'State Roads':
            titlec = 'State Roads Projects'
        elif combo.get( ) == 'Municipal Roads':
            titlec = 'Municipal Roads Projects'
        global top
        textc = 'You are in ' + titlec
        top = tk.Toplevel( )
        top.title(titlec)
        top.geometry('320x200')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = textc)
        labeltop3 = tk.Label(top, text = ' ')
        button = tk.Button(top, text = 'E X I T', command = func2)
        labeltop1.pack( )
        labeltop2.pack( )
        labeltop3.pack( )
        button.pack( )
    else:
        tkMsgbox2 = Msgbox.showerror('Error','You must select a section in \
order to proceed.')

import tkinter as tk
from tkinter import messagebox as Msgbox
from tkinter import ttk

root = tk.Tk( )
root.geometry('300x300')
root.title('Road Contractor Inc.')
label1 = tk.Label(root, height = 4, text = 'Select a section and click on ENTER :')
combolist = [' ', 'Interstates', 'Interchanges', 'State Roads', 'Municipal Roads']
combo = ttk.Combobox(root, values = combolist, height = 3)
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')

label1.pack( )
combo.pack( )
label2.pack( )
button.pack( )
label3.pack( )

root.mainloop( )
```

The user selects ‘State Roads’ in the Combobox. The user clicks on ENTER. The Toplevel that appears is:

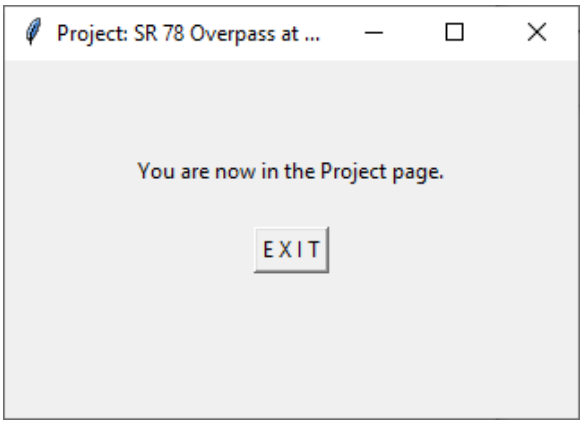
○ a.



○ b.



○ c.



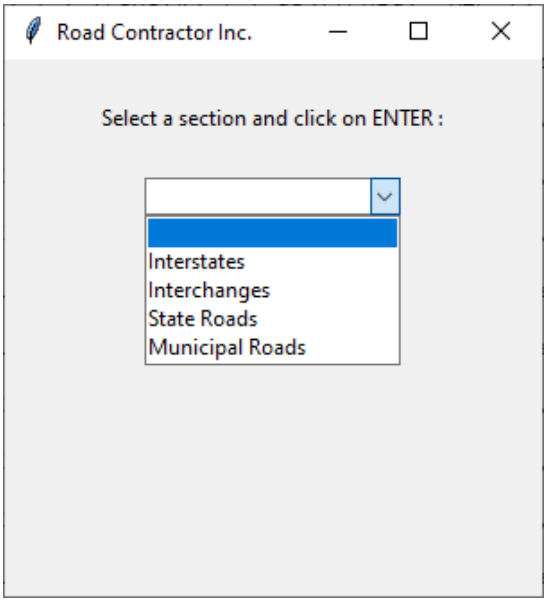
21. Given the code,

```
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Exit','Would you like to close \
the current window only?')
    if tkMsgbox2 == tk.TRUE:
        top.destroy( )
    elif tkMsgbox2 == tk.FALSE:
        tkMsgbox3 = Msgbox.showinfo('Exit','The Company app will now shut down.\
\nPlease check back often for project updates.')
        root.destroy( )

def func1( ):
```

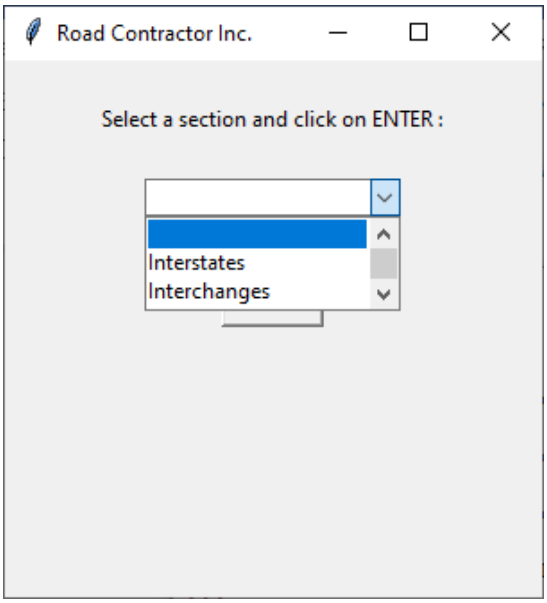
```
    global combolist
    if combo.get( ) in combolist:
        if combo.get( ) == 'Interstates':
            titlec = 'Interstate Projects'
        elif combo.get( ) == 'Interchanges':
            titlec = 'Interchange Projects'
        elif combo.get( ) == 'State Roads':
            titlec = 'State Roads Projects'
        elif combo.get( ) == 'Municipal Roads':
            titlec = 'Municipal Roads Projects'
        global top
        textc = 'You are in ' + titlec
        top = tk.Toplevel( )
        top.title(titlec)
        top.geometry('320x200')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = textc)
        labeltop3 = tk.Label(top, text = ' ')
        button = tk.Button(top, text = 'E X I T', command = func2)
        labeltop1.pack( )
        labeltop2.pack( )
        labeltop3.pack( )
        button.pack()
    else:
        tkMsgbox2 = Msgbox.showerror('Error','You must select a section in \
order to proceed.')

import tkinter as tk
from tkinter import messagebox as Msgbox
from tkinter import ttk

root = tk.Tk( )
root.geometry('300x300')
root.title('Road Contractor Inc.')
label1 = tk.Label(root, height = 4, text = 'Select a section and click on ENTER :')
combolist = [' ', 'Interstates', 'Interchanges', 'State Roads', 'Municipal Roads']
combo = ttk.Combobox(root, values = combolist)
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')

label1.pack( )
combo.pack( )
label2.pack( )
button.pack( )
label3.pack( )

root.mainloop( )
```

The user clicks on the Combobox. The Combobox items appear as:

○ a.



○ b.



○ c. None of the above

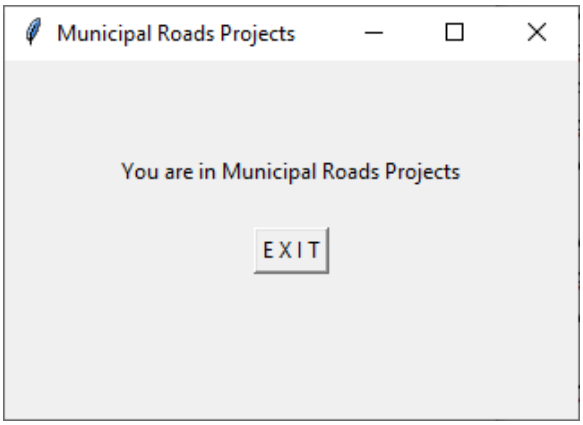
22. Given the code,

```
def func2( ):
    tkMsgbox2 = Msgbox.askyesno('Exit','Would you like to close \
the current window only?')
    if tkMsgbox2 == tk.TRUE:
        top.destroy( )
    elif tkMsgbox2 == tk.FALSE:
        tkMsgbox3 = Msgbox.showinfo('Exit','The Company app will now shut down.\
\nPlease check back often for project updates.')
        root.destroy( )

def func1(event):
    if combo.get( ) in ['Interstates', 'Interchanges', 'State Roads',\
                        'Municipal Roads']:
        if combo.get( ) == 'Interstates':
            titlec = 'Interstate Projects'
        elif combo.get( ) == 'Interchanges':
            titlec = 'Interchange Projects'
        elif combo.get( ) == 'State Roads':
```

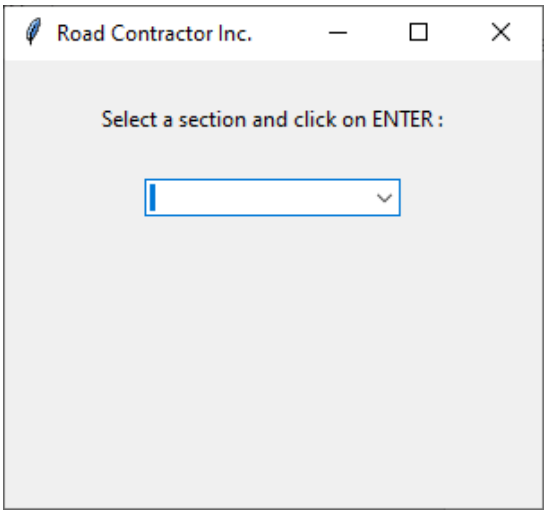
```
            titlec = 'State Roads Projects'
        elif combo.get( ) == 'Municipal Roads':
            titlec = 'Municipal Roads Projects'
        global top
        textc = 'You are in ' + titlec
        top = tk.Toplevel( )
        top.title(titlec)
        top.geometry('320x200')
        labeltop1 = tk.Label(top, height = 3)
        labeltop2 = tk.Label(top, text = textc)
        labeltop3 = tk.Label(top, text = ' ')
        button = tk.Button(top, text = 'E X I T', command = func2)
        labeltop1.pack( )
        labeltop2.pack( )
        labeltop3.pack( )
        button.pack( )
    else:
        tkMsgbox2 = Msgbox.showerror('Error','You must select a section in \
order to proceed.')

import tkinter as tk
from tkinter import messagebox as Msgbox
from tkinter import ttk

root = tk.Tk( )
root.geometry('300x250')
root.title('Road Contractor Inc.')
label1 = tk.Label(root, height = 4, text = 'Select a section and click on ENTER :')
combolist = [' ', 'Interstates', 'Interchanges', 'State Roads', 'Municipal Roads']
combo = ttk.Combobox(root, values = combolist, height = 3)
combo.bind('<>', func1)
label2 = tk.Label(root, height = 2, text = '')

label1.pack( )
combo.pack( )
label2.pack( )

root.mainloop( )
```

The user selects ‘Municipal Roads’ from the ComboBox. The following appears instantly:

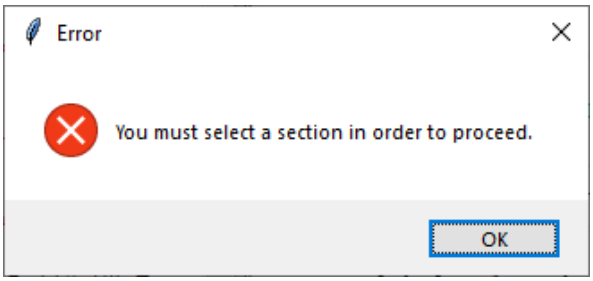
○ a.



○ b.



○ c.



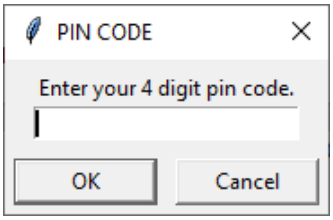
23. Given the code,

```
def func1( ):
    user = Dialog.askstring('USERNAME', 'Enter your username.')
    pin = Dialog.askinteger('PIN CODE', 'Enter your 4 digit pin code.')
    if user == 'Engineer' and pin == 1101:
        entry.delete(0, 3)
        entry.insert(0, scale.get( ))
    else:
        tkMessage = Msgbox.showwarning('DENIED', 'You are not authorized to enter \
the temperature readings.\nEnter a valid user name and pin code or contact your \
supervisor for assistance.')

import tkinter as tk
from tkinter import messagebox as Msgbox
from tkinter import simpledialog as Dialog

root = tk.Tk( )
root.geometry('300x300')

label1 = tk.Label(root, height = 4, text = '  Slide to select a temperature :')
```

```
scale = tk.Scale(root, from_ = 0, to = 100, orient = tk.HORIZONTAL,\
                 length = 200, tickinterval = 25, label = 'Degrees Celsius')
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')
entry = tk.Entry(root, text = ' ', justify = tk.CENTER)
label4 = tk.Label(root, height = 2, text = '')

label1.pack( )
scale.pack( )
label2.pack( )
button.pack( )
label3.pack( )
entry.pack( )
label4.pack( )

root.mainloop( )
```

The user selects a temperature of 92. The user clicks on ENTER. Which of the following dialogs appears?

○ a.



○ b.

○ c. None of the above.

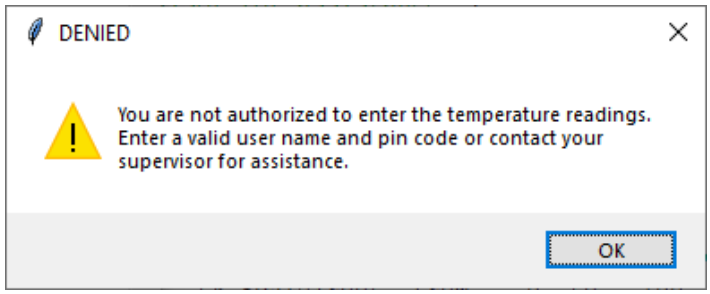
24. Given the code,

```
def func1( ):
    user = Dialog.askstring('USERNAME', 'Enter your username.')
    pin = Dialog.askinteger('PIN CODE', 'Enter your 4 digit pin code.')
    if user == 'Engineer' and pin == 1101:
        entry.delete(0, 3)
        entry.insert(0, scale.get( ))
    else:
        tkMessage = Msgbox.showwarning('DENIED', 'You are not authorized to enter \
the temperature readings.\nEnter a valid user name and pin code or contact your \
supervisor for assistance.')

import tkinter as tk
from tkinter import messagebox as Msgbox
from tkinter import simpledialog as Dialog

root = tk.Tk( )
root.geometry('300x300')

label1 = tk.Label(root, height = 4, text = '  Slide to select a temperature :')
```

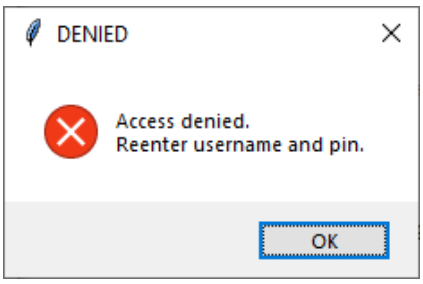
```
scale = tk.Scale(root, from_ = 0, to = 100, orient = tk.HORIZONTAL,\
                 length = 200, tickinterval = 25, label = 'Degrees Celsius')
label2 = tk.Label(root, height = 2, text = '')
button = tk.Button(root, text = 'E N T E R', command = func1)
label3 = tk.Label(root, height = 2, text = '')
entry = tk.Entry(root, text = ' ', justify = tk.CENTER)
label4 = tk.Label(root, height = 2, text = '')

label1.pack( )
scale.pack( )
label2.pack( )
button.pack( )
label3.pack( )
entry.pack( )
label4.pack( )

root.mainloop( )
```

The user selects a temperature of 92. The user enters an incorrect user name when prompted. Upon completion of entry of log in information, which of the following dialogs appears?

○ a.



○ b.



○ c. None of the above.

25. Which of the following is correct?

○ a. A simpledialog enables a user to browse through folders to select a file to open, whereas a tkFileDialog enables an executing program to pause and receive data from the user.

○ b. A simpledialog enables an executing program to pause and receive data from the user, whereas a tkFileDialog enables a user to browse through folders to select a file to open or save as.

○ c. All of the above.

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