Consider the following code:

```python
1  def main():
2      a = 10
3      b = 55
4      print("in function main........dir() = %s" % (dir()))
5      result = absdiff(a,b)
6      print("The absolute value of %d - %d = %d" % (a,b, result))
7  def absdiff(x,y):
8      print("in function absdiff.....dir() = %s" % (dir()))
9      if x > y:
10         z = x - y
11      else:
12         z = y - x
13      #
14      #Draw stack frame here
15      #
16      return z
17  main()
```

`dir()` is a Python function that lists all of the variables currently in scope.

For tracing through a program using a stack diagram, follow these steps:
1. Draw stack frame for the function that was called
   a. Allocate the function parameters in this frame (e.g., x, y)
   b. Store the local variables in this frame (e.g. a, b, z)
2. Assign the parameters the values of the arguments used when calling the function
3. Move to the function definition, and execute the function step-by-step
4. Send the return value back to calling function
5. Remove function from the stack
6. Continue executing whichever function is now remaining at top of stack

Once we call main, here’s what happens. Our stack frame:

```
main()
```

After lines 2 and 3:

```
main()

    a→10

    b→55
```

Line 4 prints to the screen

```
in function main........dir() = ['a', 'b']
```
Line 5 calls `absdiff()`. We take a look at our procedure and allocate space on the stack first:

Then allocate parameters:

Assign the parameters the value of the arguments from the call in `main()` – the values `a` and `b` respectively:

Now we start going through the function line-by-line. At line 9 we print:

```
in function absdiff......dir() = ['x', 'y']
```

line 10 is false since `x` (i.e., 10) is less than `y` (55)

we then jump to the else and execute line 13 yielding.....

**THIS IS THE SOLUTION!**

Note, `z` is a local variable and should be in the stack
Also, we have not yet hit `return` therefore you can have `result` on the stack, but it should not have a value yet.
If you are curious, to finish up…

The next line is 17 where we return \texttt{z}. We allocate \texttt{result} on the stack, assign it the return value, and then remove \texttt{absdiff} from the stack (shown here as grayed out).

This also returns execution to line 5, which is now done. We move on to line 6 which prints to the screen:

\begin{quote}
\textbf{The absolute value of 10 \textasciitilde 55 is 45}
\end{quote}

\texttt{main()} is now complete, so technically we return from this function, erase \texttt{main()} from the stack and are left with nothing, so python exits.

So, in total, the output was:

\begin{verbatim}
in function main........dir() = ['a', 'b']
in function absdiff.....dir() = ['x', 'y']
The absolute value of 10 \textasciitilde 55 = 45
\end{verbatim}