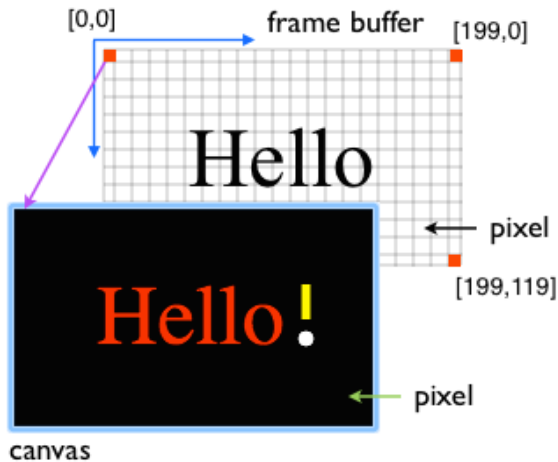# Intro to programming II

Week 4

The Canvas

The canvas is where we draw:

- The size of the canvas is in `create_frame()`
- The origin of the canvas is at top-left corner
- We draw with the special handler `draw(canvas)`
- The frame rate of the canvas is 60 frames/s

```
import simplegui

# global variables
message = "Hello"

# event handlers
def draw(canvas):
    canvas.draw_text(message, [45,75], 48,
"Red")
    canvas.draw_circle([164, 72], 4, 1,
'White', 'White')
    canvas.draw_line((164, 41), (164, 61),
5, 'Yellow')

# create a frame
frame = simplegui.create_frame("test", 200,
120)

# handler registration
frame.set_draw_handler(draw)

# start frame and timers
frame.start()
```

String processing

A string is a sequence of zero or more chars enclosed in either single or double quotes:

```
s1 = "I can't do it"
s2 = 'He said "hello" to me'
```

We concatenate strings using the + operator:

```
name = "Pat"
print( "Hello" + ' ' + name + '.' )
>>> Hello Pat.
```

We find the length of a string with `len()`:

```
s0 = "One fine day"
print( len(s0) )
>>> 12
```

We can count the characters from the beginning of the string, starting at 0:

```
        One fine day
        0123456789..
```

or from the end of the string, starting at -1:

```
        One fine day
     -12..       ..-1
```

Thus, the character `f` in s0 = "One fine day" is

```
print( s0[4] )
>>> f
print( s0[-8])
>>> f
```

We can slice the string from the first char that we want to the first char that we do not want:

```
print( s0[4 : 8] )
>>> fine
print( s0[4 : ] ) # from char 4 to end
>>> fine day
print(s0[ : 3] )  # from start to char 2
>>> One
```