

CPSC 231 Tutorial #14

michael-hung.ca/teaching

Reminders

TODAY

Quiz 7 Review

Alberta Collegiate Programming Contest (ACPC) Signup Deadline

TOMORROW

Assignment 4 Individual Component Due

Last Time...

- Strings are **immutable**. Unlike arrays, we can't change the data inside at specific indices without making a new string altogether.
- Common Python string functions:
 - `s.strip()`
 - `s.split(d)`
 - `s.lower()`, `s.upper()`
 - `s.startswith(sub)`, `s.endswith(sub)`
 - `s.find(sub)`, `s.rfind(sub)`, **in** keyword
 - `s.replace(old, new)`
- Formatting
- Slicing

stdraw

Documentation is at

<https://introcs.cs.princeton.edu/python/code/stdraw.py.html>

Always make sure to set the canvas scale:

```
setXScale(lowerXbound, upperXbound)
```

```
setYScale(lowerYbound, upperYbound)
```

Use `thickline()` instead of `line()` to control the thickness

```
thickline(from_x, from_y, to_x, to_y, pen_radius)
```

std::draw.show()

Calling `.show()` should be the last call in the program.

HOWEVER!

If we put a number inside, we can *animate* the drawing.

```
std::draw.show(m)
```

Use this version of `.show()` inside a loop, and it will refresh the canvas every *m* milliseconds.

The math module

`math.cos(x)`, `math.sin(x)`

Returns the cosine/sine of x radians

`math.acos(x)`, `math.asin(x)`

Returns the arccosine/arcsine of x in radians

`math.pi`

Returns the pi constant



Spirograph exercise

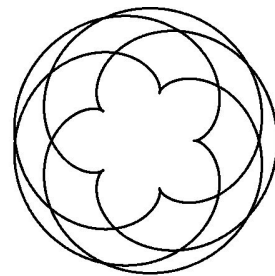
INPUT

R Radius of outer circle
 r Radius of inner circle (such that $r < R$)
 a Pen offset from center of inner circle

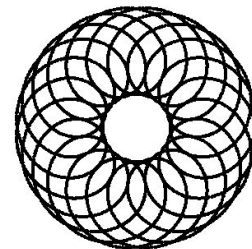
The equation of the curve at time t is given by:

$$x(t) = (R + r) \cos(t) - (r + a) \cos((R + r)t/r)$$

$$y(t) = (R + r) \sin(t) - (r + a) \sin((R + r)t/r)$$



$R = 100$
 $r = 80$
 $a = 2$



$R = 20$
 $r = 3$
 $a = 10$