ASCII Art w/ functions, loops & types

- Ancient Technology
- Discloses inner workings of modern tech.
- Teach functions w/ parameters & returns, loops, conditionals and types
- Avoids overhead of learning a graphics API (Application Programming Interface) for now
- Teaches some math. of the plane, where roving robots live.
Pre-calculus: real functions have graphs. Real: when $x$ is a real number, $f(x)$ is a unique real number called the value of the function at argument $x$. (Drawn) graph: Bunch of dots at coordinates $(x_i, f(x_i))$ for some bunch of $x_i$ values, or a smooth curve connecting them.
Goals

1. Plot the graph of one-variable function, such as the function whose graph is a semicircle. (The function will involve a square root.)

2. (next class) Draw curves or differently textured regions based on the values of 2-variable functions.
from __future__ import print_function
def thing():
    for i in range(10):
        print( 'X', sep='', end='' )
        print( ',', sep='', end='' )
space nothing
Alternatives, after class comments and my investigation..

```python
for i in range(10):
    print 'X',
```
is no good because it prints a space after each X

```python
from sys import stdout
for i in range(10):
    stdout.write('X')
```
is another way to print one character at a time with no spaces or newlines added anywhere.
012345678901234567890123456789

X

(I typed <Space> 27 times, then X, then enter)

X

(I typed <Space> 27 times, then X, then enter)
Create a Python function to print an X at the position on the line given by the function argument.

- def plot( y ) : ( y is the function’s parameter.)
- plot’s body must print y, an integer number, of spaces and then “X”
- You do it!
- TEST IT! (call plot(17), plot(25), plot(0) in the IDLE shell window.

A loop is excellent for making the computer do this task.
The math for the semicircle.

Given $x$, solve for $y$:

\[
(30.0)^2 = (x - 30)^2 + y^2
\]

\[
(30.0)^2 - (x - 30.0)^2 = y^2
\]

From class discussion:

When $x = 0$,

$y$ is equal to 0,
and the vertical side of the triangle has length 30, and so does the hypotenuse. One side = the hypotenuse = the diameter = 30 the other side is 0! The triangle is degenerate.

\[ y = f(x) \]

\[
\text{def } f(x): \quad \text{return sqrt} \left( (30.0)^2 - (x - 30.0)^2 \right)
\]

That's OK!
# sample complete .py program
# To use, open and run in the edit window
# and then call main() from shell.
from math import sqrt

def F(x):
    return sqrt(x**2 - 3*x + 3)

def printTableForF():
    for x in range(0,30):
        print x, F(x)

def main():
    print 'Hello. I will print a table'
    printTableForF()