Python on TI-Nspire CX II

T3 Europe
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Why Python?

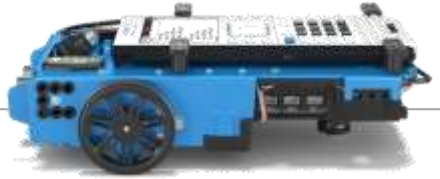
- Python is a programming language that can support students throughout their educational career (middle school through college) and into their professional career

- Python is one of the fastest growing programming languages in academia and industry

- Adding Python to the TI-Nspire CX II platform is a next step in our ongoing support for coding and STEM

What makes it special on TI-Nspire CX II?

- **Designed for education and ease-of-use for new learners**
  - Discoverable, menu-driven syntax
  - Inline prompts to guide beginners
  - Syntax highlighting and help through context-sensitive tool tips
  - Automated indentation with visible indentation marks (◆◆◆◆)
- **Physical computing**, robotics, graphics, image processing and more
- The TI-Nspire **document model** to enrich the instructional use experience
- **Interoperability**: Data can be exchanged between Python and TI-Nspire applications to create a math, science and coding ecosystem
- Hub activities offer a gentle introduction to **object-oriented programming (OOP)**
- No additional configuration, computer, building infrastructure or IT personnel required



Availability – Fall 2020

Supported

TI-Nspire CX II-T handhelds

TI-Nspire CX II-T and
TI-Nspire CX II-T CAS

Desktop software

TI-Nspire CX Student SW
TI-Nspire CX CAS Student SW
TI-Nspire CX Premium Teacher SW
Windows and Mac OS

Not Supported

TI-Nspire CX handhelds

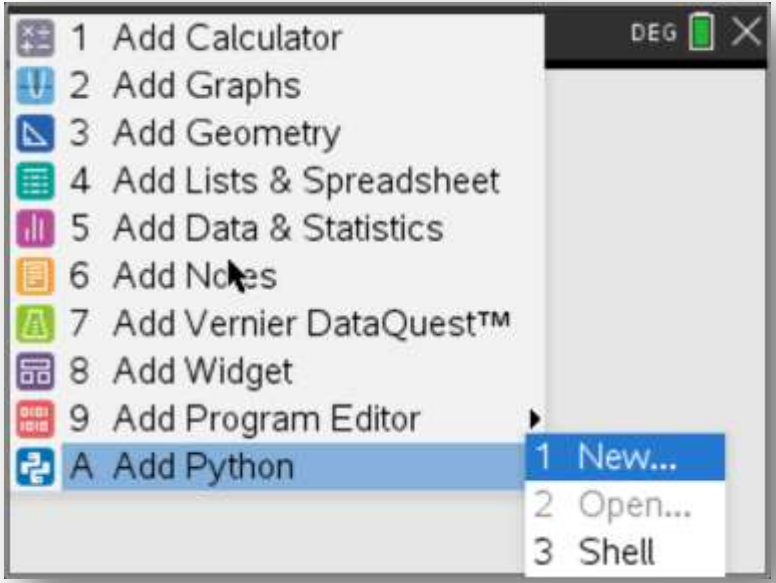
TI-Nspire iPad Apps

Where are TI Python Solutions Relevant?

- **STEM Projects** – after school clubs and camps
  - Augmenting existing TI STEM Projects
    - http://education.ti.com/stemprojects
  - Opens opportunity for new project activities and innovations
- **Computer Science**
  - Ideal portable solution for "**physical computing**"
    - High student engagement through hands-on projects with Python coding
  - "**Object oriented**" language … a modern paradigm
    - A meaningful difference for computer science
- **Math and Science**
  - Where coding supports mathematics and science curriculums
  - With teachers who are motivated to introduce coding in math and science

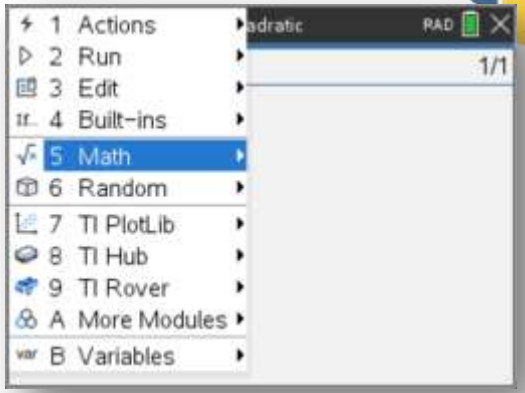
Python | in the TI-Nspire World

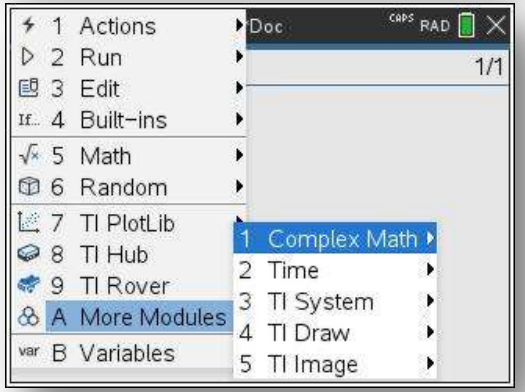
- Python is at the same level as the other TI-Nspire CX II applications
- Python programs are part of the TNS file
  - Allows additional information (instructions, graphs etc.) to be included with Python programs
- A TNS file can contain multiple Python programs
- New “PyLib” folder allows use of Python programs as “libraries” across all TNS documents



Python Modules

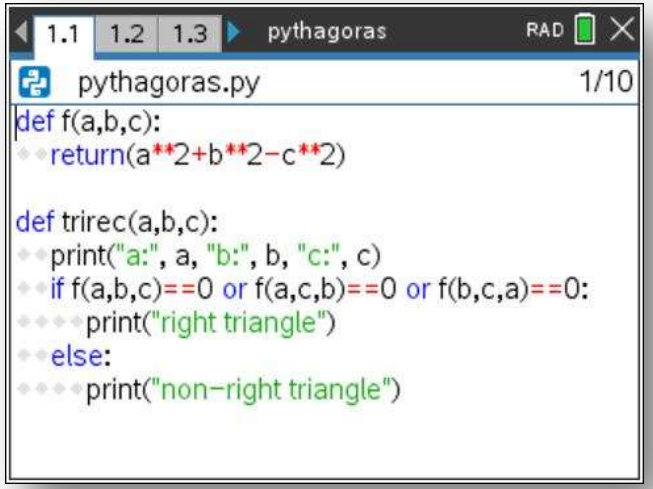
- Built-in
  - **math**: special calculator functions (sin, sqrt, abs, etc.)
  - **random**: random number generation
  - **cmath**: math with complex numbers
  - **time**: time measurement functions
- TI created
  - **ti_system**: interface to TI-Nspire CX II variables
  - **ti_hub**: interface to TI-Innovator Hub
  - **ti_rover**: interface to TI-Rover
  - **ti_plotlib**: simple plotting functions
  - **ti_draw**: geometry graphics
  - **ti_image**: image processing





Python Environments

Editor

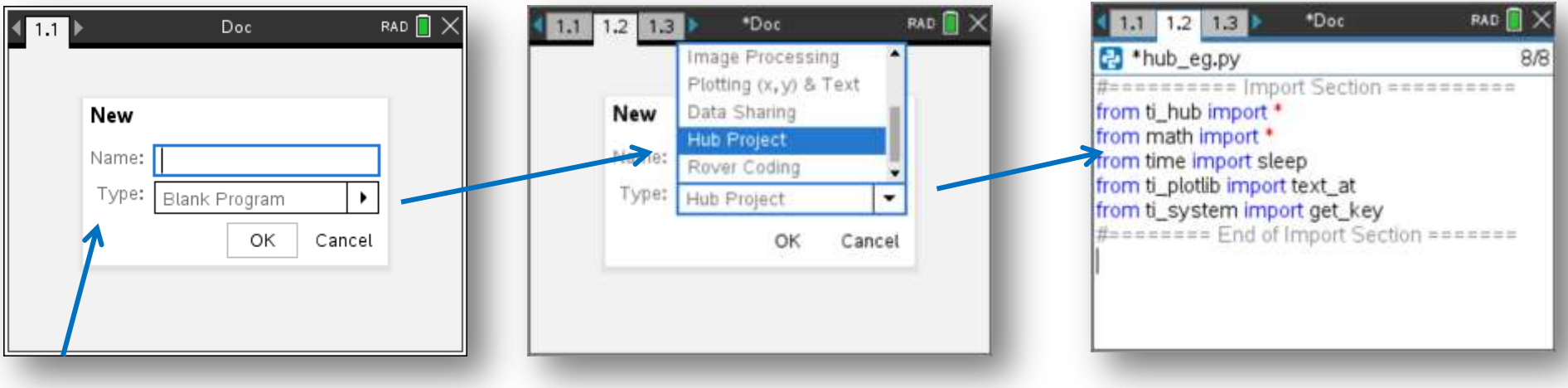


Write, save, run

Shell

Interact

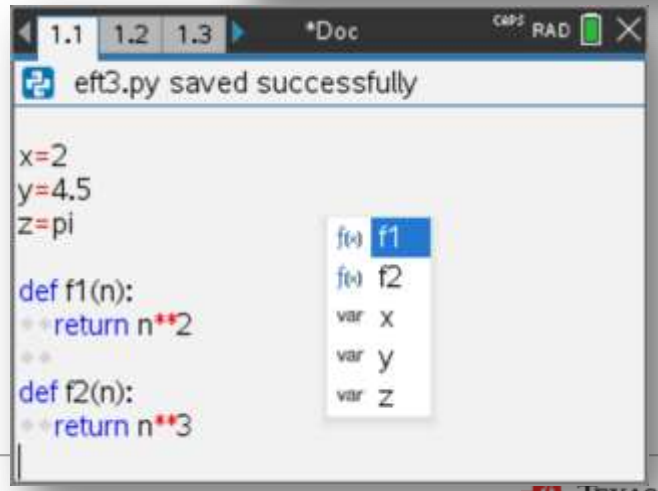
Program templates – for new programs



Optional method to pick a program type – pastes the appropriate “import” statements
Reduces need to import individual modules
Default is a ‘Blank Program’.

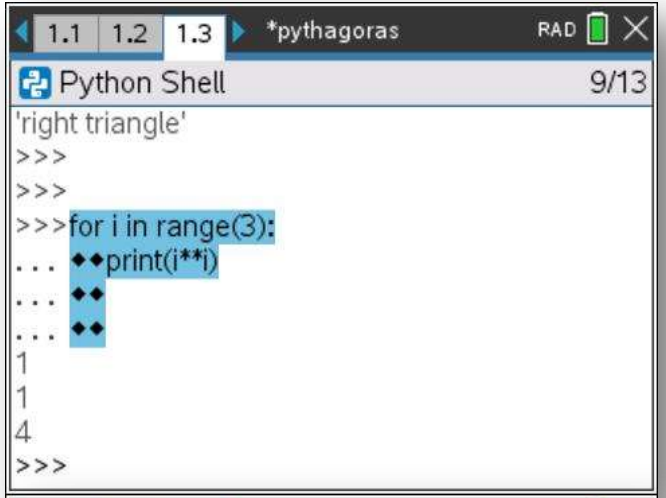
Python Editor

- Write, save and run Python programs
- Syntax highlighting + auto-indentation
- In-line prompts to guide with functions
- Tool-tips to show range of valid values
- var” key to list global variables in use
  - Functions have a special icon
- Keypad shortcuts



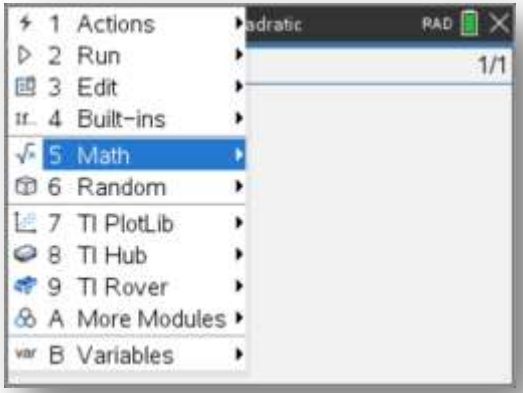
Python Shell

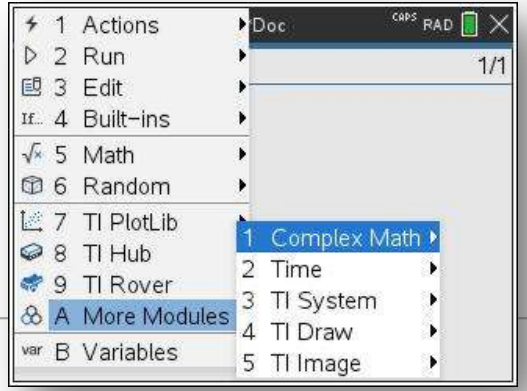
- Interactive Python environment
- Convenient to test small code fragments
- Interaction with shell output is similar to Calculator
  - Select previous inputs and outputs for re-use
- “var” key lists functions from Python program



TI Modules

- TI modules enable Python programs to interact with TI-Innovator Hub, TI-Rover and other applications
  - **ti_system**: interface to TI-Nspire CX II variables
  - **ti_hub**: interface to TI-Innovator Hub
  - **ti_rover**: interface to TI-Rover
  - **ti_plotlib**: simple plotting functions
  - **ti_draw**: geometry graphics
  - **ti_image**: image processing





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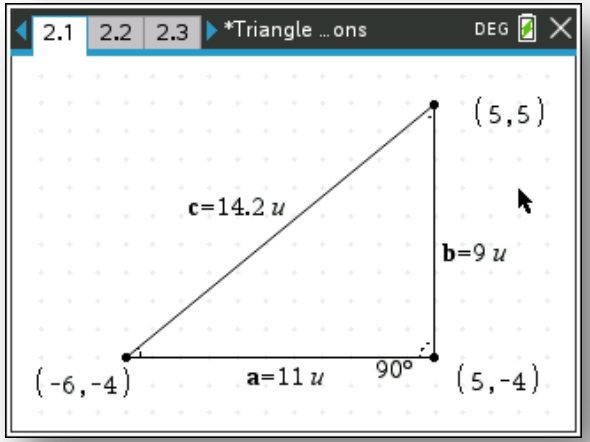
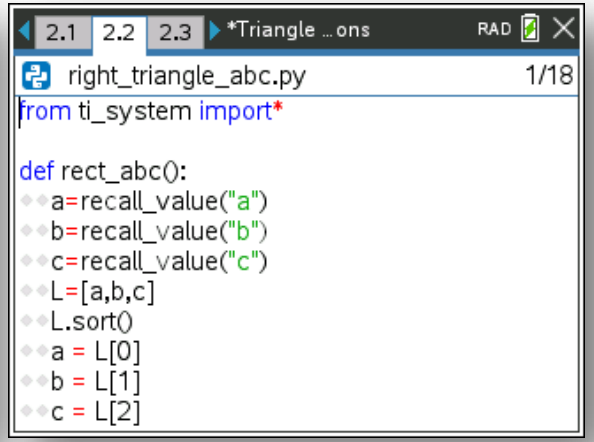
ti_system example

- Interact with TI-Nspire variables
  - **Store** values and lists created in Python to use in TI-Nspire native apps.
  - **Recall** TI-Nspire native variables and lists to use in Python
  - **Evaluate** TI-Nspire native functions in Python

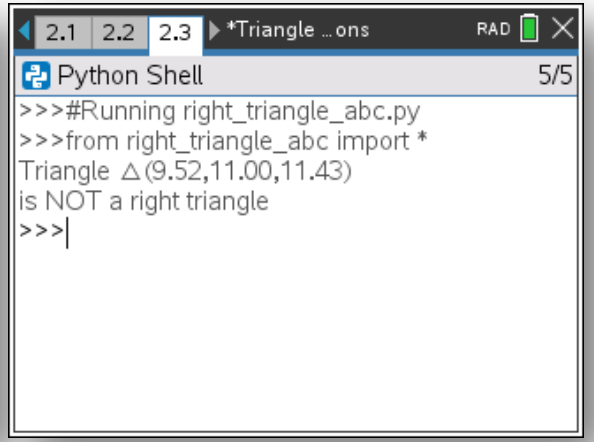
G&G: triangle with sides of length a, b, and c



Python Editor: recall values a, b, and c



Python Shell: determine if right triangle



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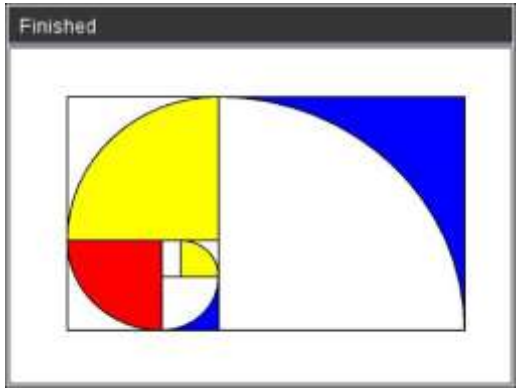
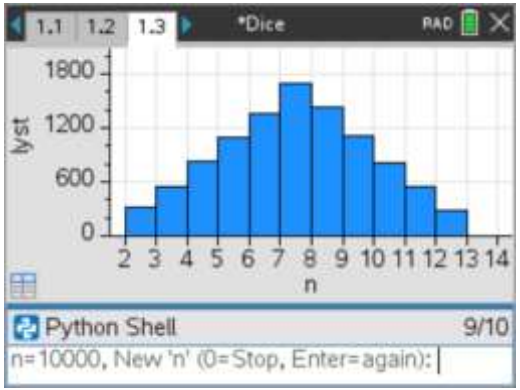
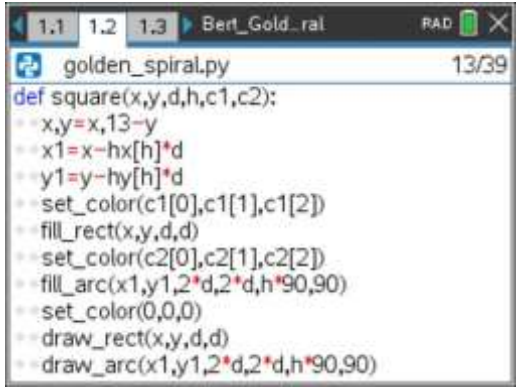
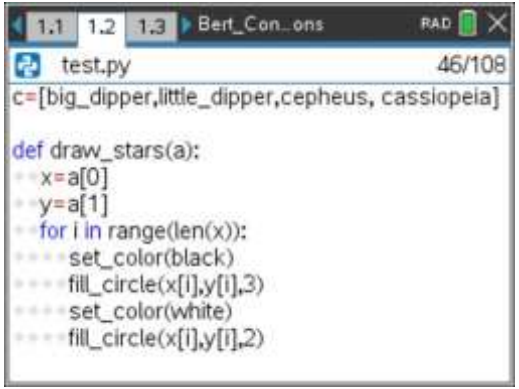
PYTHON DEMO

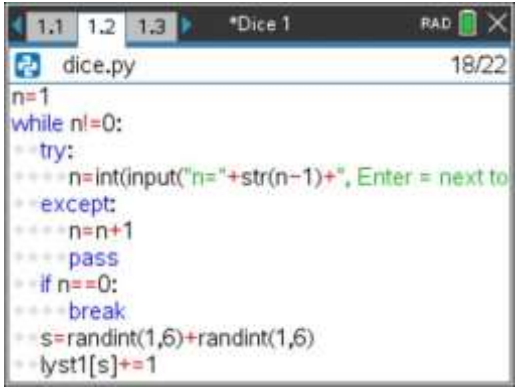
Examples of Python programs on TI-Nspire CX II











Created by Bert Wikkerink, member of the Educator Feedback Team

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Questions

- Do you use Python today?
- How will you use Python on TI-Nspire CX II with your students?
- If you have any questions later, you can email: nspirepython@list.ti.com