Introduction to:
Computers & Programming:
Exercises Using:

(the print function
and
Mathematical Operators
and
Data Types)

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Exercise 1 to 3

1. What are some simple ways to print the same thing 3 times, with a space in between each instance? Let's assume one variable as input to the function `print_3_times`.

2. What is a simple way to print the same thing 3 times, each on a newline?

3. How would you convert an arbitrary temperature from Fahrenheit to Celsius?
How to Solve a Complex Problem

• Break down big problem into small problems
  – For each small problem either:
    • Solve the problem if you know how
    • Break it down further if you don't know how to solve it and:
      – Try to solve each of the smaller problems
      – Etc.
Until we find problems easy enough to solve.
Exercise 4

• Given
  – Today's date:
    • Month, day, year, and day of the week
  – An arbitrary number of days in the future (e.g., 1500)

• How should we go about identifying that day in the future?
  – Month, day, year and day of the week
How Can We Solve This Problem?

1. Some Pieces of the Problem
   a) Find the year
   b) Find the month
   c) Find the day
   d) Find the day of the week

2. Are all calculation dependent on each other or are any independent of the others, i.e., is there an order?

3. Write Out Pseudo Code for Solving This Problem
   • We can implement this late in the term
Finding the Year and day into New Year

• Calculate day of year
  – Calculate cumulative sum of previous months + day of month

• Number of years in future = current year + (interval + day of year) // 365 (with leap year mod)

• Number of days in new year = (interval + day of year) % 365 (with leap year mod)
Given day of new year, calculate new month and day

- Current month = January
- Set days left to new day of year
- Repeat the following steps until current month is longer than days left:
  - Subtract current months days from days left
  - Set current month to next month
- Current month is the one we want
- Days left is the day of the month
Find Day of the Week

• Number days of week
  – Sunday = 0, …. Saturday = 6
• New day = ((interval+current_day_of_week) % 7)
Leap Years??

• Calculating year
  – Something more complex than mod 365

• Calculating day of year and new month
  – If leap year, adjust length of february
Summary

• A Few Simple Problems
  – Implemented in Python

• One Larger Problem
  – Broken Down into Small Problems
  – The Problems were Ordered
  – Then Solved Using Pseudo Code

• Limitations of Our Current Python Programming:
  – Variables
  – If/Then Structures
  – Repetition Structures