Introduction to:
Computers & Programming:
Planning a Complex Program

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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.

• We will ignore our current limitations in Python: We can implement this later in the term
Until we find problems easy enough to solve.
Exercise – Let's Write an Algorithm for a Complex Problem

• 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
Find Result Year

• Create Table of number of days in each month

• Turn Current Date into days
  – Day_of_year = days from previous months + current days of month
    • Loop thru previous months and sum up days into total and then add current day

• Add interval to current day
Process New Day

- \((\text{current}_\text{day} + \text{inverval})\) integer div 365 = \text{diff year in future}
- \text{current}_\text{year} + \text{diff}_\text{year} = \text{new}_\text{year}
- Get left over from year
- \text{new}_\text{day}_\text{in}_\text{year} = (\text{current}_\text{day} + \text{inverval}) \text{ mod } 365
- To get \text{new}_\text{month}:
  - Loop thru the months starting from january:
    - Stop when number of days left is less than next month
      - Then new month = next month
      - New day = days left over
Day of Week

• Make table 0,...,6 → Sunday, …, Saturday
• Current_day_number = Look up current day
• New_day_number = (current_day_number+interval) mod 7
• New_day_of_week = look up new_day_number in day_of_week table
Special Considerations for Leap Year

• Table of Months that includes 2 Februaries, depending on whether it is a leap year

• A special version of Mod for years that handled leap years