

# Geological Computing - Homework 1

## Pólya's Approach to Solving Problems

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### Due date

This homework assignment is due in class on **Wednesday, January 18th**. This homework assignment will be started in class on Wednesday, January 11th.

**Please note:** A late assignment will not be accepted! Turn in a hard (paper) copy of your answers do **not** email your answers. Answers should be typed; drawings can be hand-drawn. Please be legible and organized! Multiple pages should be stapled together. Some additional explanation is helpful and often necessary for the person reading your assignment to understand exactly what you are doing and why. Assume that the person grading your assignment does not have a copy of the assignment. What is important here is that (1) you understand what you are doing, and (2) that you can communicate what you are doing to others.

### Part 1 - Understanding the problem

Describe a problem (ANY problem) in geological hazard assessment that you would like to solve using a computer program. It does not matter if you do or do not know HOW to solve the problem. Use Pólya's problem solving approach for arriving at a solution to this problem (refer to the PDF of *Lecture 1: Understanding algorithms in geology*; download this PDF from Canvas).

**Understand the problem:** Write a paragraph describing your problem and why you think the problem is important.

**Visualize the problem:** Draw a figure or flowchart to illustrate your problem. Try to make the figure to scale.

**Develop notation:** Describe and express the unknown quantities as variables. What data is needed to solve your problem. Describe/show the functional relationship between variables.

**Divide and conquer:** Isolate parts of the problem to show how small steps can be used to solve a larger, more complex problem.

### Part 2 - Devising a plan

Using Pólya's method, solve the problem described on slide 1.16 of Lecture 1: **What is the volume of water in Crater Lake?**

**Understand the problem:** Use the previous steps to describe this problem.

**Devise a plan:** Clarify the connection between the unknowns and the data, consider the units; define a functional relationship between the unknown(s) and the data.

**Specify an algorithm:** Provide a finite set of unambiguous steps that are followed in order to provide a solution to the problem.

**Make a flowchart:** Visualize your algorithm by drawing a flowchart. See slides 1.24 and 1.25 of Lecture 1 for an example of a flowchart.