# CS100M Spring 2008 Project 1  due Thursday 1/31 at 6pm

You must work either on your own or with one partner. You may discuss background issues and general solution strategies with others, but the project you submit must be the work of just you (and your partner). If you work with a partner, you and your partner must first register as a group in CMS and then submit your work as a group.

## Objectives

Completing this project will help you learn about MATLAB script, branching, and some MATLAB built-in functions. You will also start to explore MATLAB graphics.

## 1 Platonic Solid (What???)

→ A solid is a *Platonic solid* if each face is identical in size and shape.
Complete exercise **P1.1.5** in Chapter 1 of *Foundations of Computational Science & Engineering* by FVL. (See page 7 of Chapter 1). Save the file as `solids.m`.

## 2 Cubic Function

Complete exercise **P1.2.10** in Chapter 1 of *Foundations of Computational Science & Engineering* by FVL. (See page 14 of Chapter 1). Save the file as `cubicF.m`.

*Looking ahead*: This modification to **P1.2.10** looks ahead to an organization of `if-else` statements that we haven't covered yet. You can do this for fun, but it is *not for credit*. Write your script `cubicF` such that it additionally determines and prints whether the cubic function is simple or not simple.

## 3 Where did you click?

Download the program `clickFigure.m` and run it. A graphics window will pop up and the message near the top (the title area) says to click in the window. After you click, two vertical lines will be drawn and your mouse click location is given in the message as the title.

Read the program to make sure you understand what it does. Don't worry about the early commands to set up the figure window, but here's how the `plot` statement works: `plot([x1 x2] [y1 y2])` draws a line from the point (x1,y1) to (x2,y2). The statement `title('hello there')` displays the text 'hello there' as the title of a figure. The `sprintf` statement works just like `fprintf` in formating text, but instead of printing directly to the Command Window, `sprintf` allows the text to be saved under a variable name. Then this text (string) variable can be used in other statements, such as the `title` statement used near the end of the program.

Your job is to modify this program:

1. Your program should draw two vertical lines at random x-coordinates instead of the specific x-coordinates currently written into the program. The red line should be randomly placed within the range of the given axis (between 0 and 9). The blue line should be randomly placed in the x-range of 3 to 8.
   *Hint*: The statement `v = rand(1)` assigns to variable `v` a random number in the range of 0 to 1. Note that the 1 in the parentheses indicates that one number is to be generated — it has nothing to do with the range. So how do you get a random number within a different range? First, the statement `v = rand(1)` gets you a real number in the range of 0 to 1. Next, scale (think multiply) and shift (think add) the value `v` to get the range you want.

2. Your program should mark the location of the user's mouse click. The statement `plot(x,y,'*')` draws an asterisk at point (x,y). Experiment with other markers! 'x' for an x, 'o' for a small circle, '+' for, well, you can guess... Use your favorite marker!

3. Your program must determine where the mouse click is relative to the lines, which are drawn *after* the mouse click. The program should display one of three messages as the title: You clicked left of both lines, You clicked right of both lines, or You clicked between the lines. If a click is exactly on a line, it's up to you which message to use.