

## Assignment #1

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### **Due: Thursday, October 5**

Write out answers to each of these problems, all of which come from the reader. You can write them out on paper, but I encourage you to test your solutions by using the web links on the CourseWork web site.

### **Problem 1—Programming the Difference Engine**

- (a) For each of the first two exercises in the puzzle box on page 57 (we did the progression of cubes in class), write out the Difference Engine program that generates the desired series.
- (b) Spherical objects, such as cannonballs, can be stacked to form a pyramid. For example, a cannonball pyramid with three layers has one cannonball at the top, which sits on top of a square composed of four cannonballs, which in turn sits on top of a square composed of nine cannonballs. The total number of cannonballs is a function of the number of layers. The number of cannonballs in an empty pyramid is 0, the number in a pyramid with one layer is 1, the number in a pyramid with two layers is  $5(1+4)$ , the number in a pyramid of three layers is  $14(1+4+9)$ , and so on. Program the Difference Engine to produce a table showing the number of cannonballs as the height increases.

### **Problem 2—Programming the Analytical Engine**

Solve the three exercises in the puzzle box on page 70.

### **Problem 3—Using the Babbage machines in the classroom**

Come up with an example or exercise using either of the two Babbage machines that you feel would be useful in a classroom context.