You may work in pairs or purely individually for this assignment. Prepare your answers to the following questions in a plain ASCII text file or MS Word document. Submit your file to the Curator system by the posted deadline for this assignment. No late submissions will be accepted. If you work in pairs, list the names and email PIDs of both members at the beginning of the file, and submit your solution under only one PID. No other formats will be graded.

For this assignment, you may (and are encouraged to) work in pairs; if you do so, you must also write your solutions in such a way that it is clear how each member contributed to deriving the solution.

You will submit your answers to the Curator System (www.cs.vt.edu/curator) under the heading `OOC05`.

For each of the following questions, you are asked to derive a recurrence relation. You must explain clearly why your recurrence relation is correct, but you are not required to solve the recurrence.

1. [25 points] When climbing a flight of stairs, you can take one stair at a time or take two stairs at a time. Of course, you can mix the two choices as well. Find a recurrence relation for the number of different ways you could climb a flight of N stairs, where $N > 0$.

2. [25 points] A robot can move forward by stepping 10 cm, or by hopping 20 cm, or by leaping 30 cm. Find a recurrence relation for the number of different ways the robot could move forward $10N$ cm, for $N > 0$.

3. [25 points] Find a recurrence relation for the number of ways to arrange a sequence of flags on an N-foot flagpole, if you have three kinds of flags: blue flags and green flags that are 3 feet tall and red flags that are 1 foot tall.

4. [25 points] You have an unlimited number of red, blue and green cubes. Find a recurrence relation for the number of different ways to build a vertical stack of N blocks, for $N > 0$, such that there are never two adjacent blue blocks.