1. CS5391 Survey of Software Engineering
   Describe the pros and cons of the following models and point out their applications.
   
   (a) linear sequential
   (b) incremental
   (c) spiral

2. CS5392 Formal Methods in Software Engineering
   (a) Provide a total correctness proof (i.e., including termination) for the following function (show all the intermediate assertions including an invariant and lemmas' proofs):

   \{x_1 \geq 0 \text{ and } x_2 > 0\}
   \text{input } x_1, x_2;
   y_1 := 0;
   y_2 := x_1;
   \text{while } y_2 \geq x_2 \text{ loop}
     y_1 := y_1 + 1;
     y_2 := y_2 - x_2;
   \text{end loop;}
   z_1 := y_1;
   z_2 := y_2;
   \{(x_1 = (z_1 \times x_2 + z_2)) \text{ and } (0 \leq z_2 < x_2)\}

   (b) Describe relative advantages and weaknesses of model checking and verification by proof

3. CS5393 Software Quality
   Refer to the pseudo-code that follows, construct a corresponding Control Flow Graph and show all work to accomplish the following: List the minimum number of paths required to achieve all-uses coverage and the paths themselves.
   
   Notes: The All-uses coverage criterion requires definition-clear paths from each definition to each use (of a variable) reached by that definition and each successor node of the use. The paths must be from the start node to the end node of your CFG (there should be a node in the CFG per each numbered line in the pseudo-code).

   1. input(x, y);
   2. if x < 0 then
   3.   x := 1;
   \text{end if;}
   4. if y > 0 then
   5.   y := 0;
   \text{end if;}
   6. output (x, y);