1. CS5391 Survey of Software Engineering
   Describe the following process models and their application scope.
   
   (a) incremental model
   (b) prototyping model

2. CS5392 Formal Methods in Software Engineering
   Given a Kripke model M=W,R,L, where worlds W=\{x_1, \ldots, x_n\}, for some \( n \in \mathbb{N} \) and \( n \geq 2 \); relations \( R = \{(x_2, x_4), \ldots, (x_{n-1}, x_n), (x_n, x_2)\} \cup \{(x_1, x_2), (x_1, x_3), \ldots, (x_1, x_n)\} \), and the labeling function \( L \) is defined as

   \[
   L(x_k) = \begin{cases} 
   \{p, q, s\}, & \text{if } k \text{ is odd and } 2 \leq k \leq n \\
   \{q, r\}, & \text{if } k \text{ is even and } 2 \leq k \leq n \\
   \{s, r\}, & \text{if } k \text{ is equal to } 1
   \end{cases}
   \] (1)

   (a) Show whether \( \varphi = (((s \lor r) \rightarrow r) \rightarrow \square q) \rightarrow \square r \) ever holds in world \( x_1 \). Explain why.
   (b) Show whether \( \varphi = (\square q \lor ((p \rightarrow q) \land (q \rightarrow \neg r))) \rightarrow (\diamond q \land \diamond r) \) holds in all worlds \( x_k \) where \( k \) is odd, i.e., \( k = 2 \cdot s + 1 \), \( s \in \mathbb{N} \). Explain why.

3. CS5393 Software Quality
   Refer to the code fragment that follows, construct a corresponding Control Flow Graph and show all work to accomplish the following: Find a minimal test set (tuples of inputs for method \( f_1 \)) that achieves edge coverage.

   ```java
   public static void f1(int x, int y)
   {  
      if(x < y) { f2(y); } else { f3(y); }
   }
   
   public static void f2(int a)
   {  
      if( a%2 == 0 ) { f3(2*a); }
   }
   
   public static void f3(int b)
   {  
      if(b > 0) { f4(); } else { f5(); }
   }
   
   public static void f4() {... f6(); ...
   public static void f5() {... f6(); ...
   public static void f6() {...
   ```