# EECS4313 week 5

Jerry Wu

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# Contents

# Section 1

# Control flow & data flow in practice

## 1.1 Structural coverage in practice

- The most common application of graph criteria is to the **program source**
- **Graph**: Usually the CFG
  - Node coverage: Execute each statement
  - Edge coverage: Cover every branch (if else cases)
  - Basic block: A sequence of statements such that if the first statement is executed, all statements will be executed (i.e. no branches)
- **Loops**: Looping structures such as for, while, etc.
- **Data flow coverage**: Augment the CFG
  - Defs are statements that **assign** values to variables
  - Uses are statements that **use** variables
  - Branch predicates are the conditionals inside of loop and if/else if clauses

*"What else?" - H.V. Pham 2024*

### 1.1.1 If statement and loop representation

- Basic if/else structures are represented by a diamond shaped graph in CFGs

*"Real diamond is good, this one is not" - H.V. Pham 2024*

- In loops, cannot combine non branching statements prior to loop clauses with the loop clause into one node because the loop will re initialize the value every time it loops

```
1 x=0;       //CANNOT COMBINE
2 while(x<y) //THESE LINES INTO ONE NODE
3 {
4   y=f(x,y);
5   x++;
6 }
```