

**CIS 4930: Secure Coding [Fall 2018]**  
**Test I**

**NAME:** \_\_\_\_\_

**Instructions:**

- 1) This test is 5 pages in length.
- 2) You have 40 minutes to complete and turn in this test.
- 3) Short answer and essay questions include guidelines for how much to write. Respond in complete English sentences. Responses will be graded as described on the syllabus.
- 4) This test is closed books, notes, papers, smartphones, laptops, friends, neighbors, etc.
- 5) Use the backs of pages in this test packet for scratch work. If you write more than a final answer in the area next to a question, circle your final answer.

1. [15 points]

Describe an example policy  $P$  that may be enforced by a type checker, and explain how a type checker can enforce  $P$ , at the level of detail discussed in class. [2-4 sentences]

2. [4 points]

What are Type I and Type II errors? [1 sentence]

3. [15 points]

Why do we separate policies from mechanisms? What is the relationship between policies and mechanisms? [2-4 sentences]

4. [4 points]

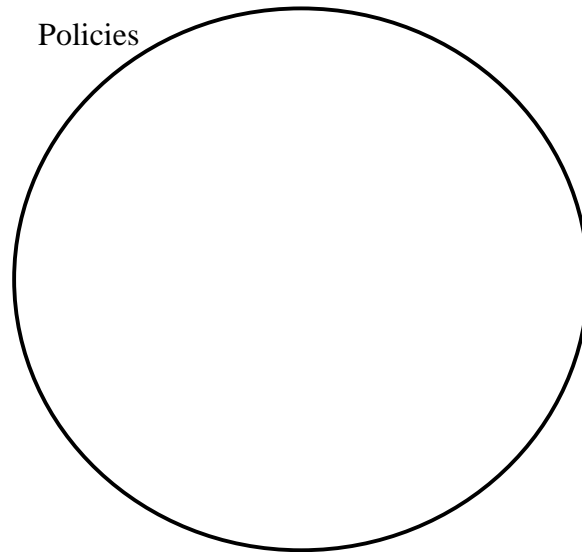
What is dead code? [1 sentence]

5. [20 points]

Compare and contrast static and dynamic mechanisms. State the primary advantages and disadvantages of each. [1 paragraph]

6. [7 points]

Complete the diagram below by drawing the subsets of policies discussed in class.



7. [35 points]

For each of the following policies, write “pol” if it is a non-property policy, “prop” if it is a non-safety and non-liveness property, “S” if it is a safety property, and “L” if it is a liveness property. Also write 1-2 sentences for each policy, explaining the intuition behind your answer.

$$P_1 = \{ \{t^1, t^2, \dots\} \mid \forall i: t^i \text{ is infinite} \}$$

$$P_2 = \{ \{t^1, t^2, \dots\} \mid \forall i, j, n, m: (input(n) \in t^i \wedge output(m) \in t^i \wedge input(n) \in t^j) \Rightarrow (output(m) \in t^j) \}$$

$P_3 = \{ \{t^1, t^2, \dots\} \mid \forall i: \varepsilon \leq t^i \}$   
(where  $\varepsilon$  is the empty trace, which is a prefix of every trace)

$P_4 = \{ \{t^1, t^2, \dots\} \mid \forall i: \text{write}(5) \notin t^i \}$

$P_5 = \{ \{t^1, t^2, \dots\} \mid \forall i, j, t:$   
 $(t; \text{request-resource}(j) \leq t^i) \Rightarrow (t; \text{request-resource}(j); \text{send-resource}(j) \leq t^i) \}$   
(Every request for resource  $j$  must be followed by a send of that resource.)