

## CS4112 Tutorial Exercises 3

1. Which of the following are propositions?
  - What is your name?
  - David is my name
  - Tutorials are compulsory
  - Go to tutorials
  
2. Identify propositions,  $P, Q$  in the following argument and then formalise it using the logical symbols. Confirm your answer using truth tables.  
Hint: Recall our definition of a valid argument.  
If 6 is a prime, 6 cannot be equal to 2 times 3. 6 is equal to 2 times 3.  
Therefore 6 cannot be prime.
  
3. Consider the following code:  
 $x = x * x; \quad y = y * y; \quad z = x + y$   
Suppose the initial state is  $x = 3, y = 4, z = 0$ . Determine the state after each statement and find the final state.
  
4. Are any of the following Hoare Triples correct. Explain your answer.
  - (a)  $\{i > 10\} i = i + 3 \{i > 20\}$
  - (b)  $\{i > 10\} i = i + 3 \{i > 10\}$
  - (c)  $\{a < b\} a = b \{a < b\}$
  
5. Suppose that  $\{sum > 1\} sum := sum + 4 \{sum > 5\}$  is correct. Which of the following can be proved correct also? Explain!
  - $\{sum > 2\} sum := sum + 4 \{sum > 5\}$
  - $\{sum \geq 1\} sum := sum + 4 \{sum > 5\}$
  - $\{sum > 0\} sum := sum + 4 \{sum > 5\}$
  - $\{sum > 1\} sum := sum + 4 \{sum > 6\}$
  - $\{sum > 1\} sum := sum + 4 \{sum > 4\}$