

## HOARE'S LOGIC

### Assignment instructions

- These are short answer questions to allow you time to read for your exams and also enough to practice and get a hint of the topic we are going to discuss.
- Avoid plagiarism as much as you can as this leads to disqualification and loss of marks.
- Remember to show your working clearly and make your solution or answer explicit.

1. Are the following specifications partially correct?

(a)  $\{x = 1\}y := x\{y = 2\}$

(b)  $\{x = a \wedge y = b\}x := y; y := x\{x = b \wedge y = a\}$

(c)  $\{True\}r := x; t := 0; WHILE\ y \leq r DO(r := r - y; t := t + 1)\{r < y \wedge x = r + (y * t)\}$

2. Find the precondition assuming the statement  $x := x + b + 1$  executes and terminates in a state satisfying  $(b = 2) \wedge (x = y + b)$ .

3. What is the suitable precondition for the code;  $x := x + 1; x := x * x$  to establish a post-condition  $\{x \geq 16\}$

4.  $\{P\}$  if  $(i \leq j)$  then  $m := i$  else  $m := j$   $\{(m \leq i \wedge m \leq j) \wedge (m = i \vee m = j)\}$  What is the weakest precondition  $\{P\}$

5. Prove partial correctness of the following program

$$\{x \geq 0 \wedge y \geq 0\}$$

$$a := 0;$$

$$b := x;$$

$$WHILE\ (b \geq y)\ DO$$

$$b := b - y;$$

$$a := a + 1$$

$$od:$$

$$\{x = a * y + b \wedge b \geq 0 \wedge b < y\}$$