

# Tutorial 3

## COMP 3601

### Design and Analysis of Algorithms

#### Question 1

Use the mathematical induction method to prove that

$$\log_2 n < n, \quad \forall n \geq 1.$$

#### Question 2

Use the definition of Big-Oh notation,  $O$ , to show that

$$\log_2 n \in O(\sqrt{n}), \quad \forall n \geq 1.$$

(Hint: Use the inequality proved in Question 1)

#### Question 3

Use the limit and L'Hôpital's rule to show that

$$(\ln n)^2 \in O(n^{1/2}).$$