DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES

MAT1142/ MAT1542

ASSIGNMENT No.1 DUE DATE: 22-03-2023 before 3pm

INSTRUCTIONS:

(i) Answer all questions.

(ii) Write neatly.

(iii) Submit in groups. Make sure your student number is correct and you have signed before submitting.

Questions

1. Consider the following statements

   $P(x)$: x has an interior angle that exceed 180^0,
   $R(x)$: x is a rectangle
   $S(x)$: x is a square,
   $I(x)$: x is an isosceles triangle,
   $E(x)$: x is an equilateral triangle.

   Translate each of the following into an english sentence

   (i) $\exists x, [E(x) \wedge P(x)]$,
   (ii) $\exists x, [R(x) \wedge \rceil P(x)]$,
   (iii) $\forall x, [I(x) \Rightarrow \rceil P(x)]$.

2. Translate each of the following statements into symbols, using quantifiers, variables and open statements symbols

   (i) Some men are gaints,
   (ii) All men are gaints,
   (iii) Every complete bipartite graph is not planar.

3. Prove by mathematical induction

   (i) $9^n + 3$ is divisible by 4 $\forall n \in \mathbb{N}$,
   (ii) $\sum_{j=1}^{n} x^j = \dfrac{1 - x^{n+1}}{1 - x}$, for $x \neq 1$
   (iii) $F_n \leq \left(\frac{1+\sqrt{5}}{2}\right)^n \forall n \geq 1$, where F_n are the Fibonacci number.

END