Aiming For A* Live Sessions Friday at 5pm

Name: _____

Proof Exam Questions

Topic Test and Revision

Date:

Time: 45 Minutes

Total marks available: 30

Total marks achieved: _____

Calculator Allowed

Mathvault.io

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Questions

Q1.

(i) Show that $x^2 - 8x + 17 > 0$ for all real values of x

(3)

(ii) "If I add 3 to a number and square the sum, the result is greater than the square of the original number."

State, giving a reason, if the above statement is always true, sometimes true or never true.

(2)

(Total for question = 5 marks)

(**Q02 8MA0/01, June 2018**)

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Q2.

Given $n \in \mathbb{N}$, prove that $n^3 + 2$ is not divisible by 8.

(Total for question = 4 marks)

(**Q15 8MA0/01, June 2019**)

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Q3.

(i) A student states

"if x^2 is greater than 9 then x must be greater than 3"

Determine whether or not this statement is true, giving a reason for your answer.

(1)

(ii) Prove that for all positive integers n,

$$n^3 + 3n^2 + 2n$$

is divisible by 6

(3)

(Total for question = 4 marks)

(**Q14 8MA0/01, June 2022**)

Q4.

In this question p and q are positive integers with $q > p$

Statement 1: $q^3 - p^3$ is never a multiple of 5

(a) Show, by means of a counter example, that Statement 1 is **not** true.

(1)

Statement 2: When p and q are consecutive even integers $q^3 - p^3$ is a multiple of 8

(b) Prove, using algebra, that Statement 2 is true.

(4)

(Total for question = 5 marks)

(**Q17 8MA0/01, June 2023**)

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Q5.

Prove, using algebra, that

$$n^2 + 5n$$

is even for all $n \in \mathbb{N}$

(Total for question = 4 marks)

(**Q14 8MA0/01, June 2024**)

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Q6.

$$\text{“}n^3 + 4n \text{ is prime for } n \in \mathbb{N}\text{”} \qquad \text{(I)}$$

(a) Determine whether statement (I) is always true, sometimes true or never true.
You must fully justify your answer.

(2)

$$\text{“}n^3 + 5n \text{ is prime for } n \in \mathbb{N}\text{”} \qquad \text{(II)}$$

(b) Determine whether statement (II) is always true, sometimes true or never true.
You must fully justify your answer.

(2)

(Total for question = 4 marks)

(**Q15 8MA0/01, June 2025**)