

Advanced Higher Maths
SQA 2024 Paper 2
Question 11



Consider statements A and B below.

For each statement: if true, provide a proof; if false, provide a counterexample.

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A: The sum of the squares of any two consecutive integers is always prime.

B: The sum of the squares of any two consecutive integers is always odd.

Answer:

A is false: counterexample $3^2 + 4^2 = 25$, which is not prime, for example.

B is true: direct proof, eg. $k^2 + (k+1)^2 = 2(k^2 + k) + 1$, which is odd $\forall k \in \mathbb{Z}$.