Let me solve the question about eigenvalues and matrices:

"Consider a 4×4 matrix P where:  
P = [2 -1 3 0; 1 4 -2 1; -3 2 5 -1; 0 -1 2 3]

To prove or disprove that λ² + 2 is always an eigenvalue of P² + 2I, where λ is an eigenvalue of P:"

Let's solve this step by step:

First, let's understand what we're proving:

If λ is an eigenvalue of P

We need to check if λ² + 2 is an eigenvalue of P² + 2I

Key properties:

If λ is an eigenvalue of P, then λ² is an eigenvalue of P²

Adding 2I to P² shifts all eigenvalues by 2

Let's prove this:

Let v be an eigenvector of P with eigenvalue λ

Then Pv = λv

P²v = P(Pv) = P(λv) = λ(Pv) = λ(λv) = λ²v

(P² + 2I)v = P²v + 2v = λ²v + 2v = (λ² + 2)v

This proof shows that if λ is an eigenvalue of P, then λ² + 2 is indeed an eigenvalue of P² + 2I!

For the second part about λ² - 2 and P² - 2I:  
The relationship would follow the same pattern. If λ is an eigenvalue of P, then λ² - 2 would be an eigenvalue of P² - 2I, following the same logic as above.

Therefore, the original statement is TRUE - λ² + 2 is always an eigenvalue of P² + 2I when λ is an eigenvalue of P.