1 | **Linear Dependence Lemma**

- Why do we care that j is the largest element? #question
  - So we can add up everything before it? Just arbitrary?
  - Oh, so we can cancel *everything* after it.
  - Can also choose the smallest, it's just about segmenting
- How does 2.22 work? #question
  - To get to 2.22, subtract everything but $a_j v_j$ from both sides of $a_1 v_1 + ... + a_m v_m = 0$
  - Everything past v_j has to equal 0.
  - So we get $a_j v_j = -a_1 v_1 - ... - a_{j-1} v_{j-1}$
  - Divide by a_j and we get 2.22
  - Thus, v_j is a linear combination of the other vectors
  - And in the $span(v_1, ..., v_j - 1)$
- What v_j is it replacing? #question
  - It's replacing what's in the "…", which is unclear.. is v_j actually in the equation then? Or just in the value? #question
  - Now, we can remove the j^{th} finally, and represent it as the linear combination of the previous elements
  - $\therefore$ any element of the span can be represented without v_j This is called a direct proof! Also, we can iterate this process until we get a linearly independent list.