1 | **Problem**

What happens if the Gram–Schmidt Procedure is applied to a list of vectors that is not linearly independent?

2 | **Answer**

Suppose the list $v_1, \ldots, v_n$ is linearly dependent. Then, there exists some v_j s.t. $v_1, \ldots, v_{j-1}$ is linearly independant while $v_1, \ldots, v_j$ is not. Then, $v_j \in \text{span}(v_1, \ldots, v_{j-1})$

Because the Gram-Schmidt procedure preserves prefix spans,

$$v_j \in \text{span}(e_1, \ldots, e_{j-1})$$

Thus, the denominator is equivalent to

$$kvjhvj; e1ie1hvj; ej1iej1k$$