Structure Theorem

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Text follows Altman, Kleinman.

Lemma 1. If A is a principal ideal domain, and M is a free A-module, then any submodule N is free.

Theorem 2. Let A be a principal ideal domain, and M a finitely generated A-module. Then

1. $M \cong M_{\text{Tor}} \oplus A^n$ for some $n \in \mathbb{N}^+$.