Knowing and understanding a definition means being able to write the mathematical statement of the definition and also being able to explain the definition in your own words. For example, the mathematical definition of span \( \{ \vec{v}_1, \ldots, \vec{v}_p \} \) is the set
\[
\{ c_1\vec{v}_1 + \cdots c_p\vec{v}_p, \text{ where } c_1, \ldots, c_p \text{ are scalars} \}.
\]
In words, the span of a given set of vectors is the set of all possible linear combinations of those vectors, or in other words, all vectors that you can write as linear combinations of the vectors \( \vec{v}_1, \ldots, \vec{v}_p \).

Here are the words whose definitions you should know and understand for Midterm Two:

- Definitions that we learned after Midterm One:
  - vector space (A set of vectors with two operations, namely vector addition and scalar multiplication. The operations have some nice properties like associativity and commutativity.)
  - subspace of a vector space
  - basis (of a vector space)
  - dimension (of a vector space)
  - null space, column space, row space (of a matrix)
  - rank (of a matrix)
  - range, kernel (of a linear function)
  - determinant (of a matrix)
- Definitions that we learned before Midterm One (you know these already ¨ vicinity):
  - linear combination (of a set of vectors)
  - span (of a set of vectors)
  - linear independence/dependence (of a set of vectors)
  - linear transformation (a special type of function with two properties)
  - onto, one-to-one (adjectives that describe functions)
  - inverse (of a matrix)

Here are vocabulary words that you should understand. In other words, if these vocabulary words appear in a question, you should be able to understand what the question is asking. Moreover, you might find these words useful in answering some of the exam questions:

- Vocabulary words that we learned after Midterm One:
  - standard basis of \( \mathbb{R}^n \)
  - change of coordinates matrix (from one basis of a vector space to another)
  - cofactor expansion (in the context of computing a determinant)
- Vocabulary words that we learned before Midterm One (you know these already ¨ vicinity):
  - consistent, inconsistent (in the context of linear systems)
  - augmented matrix, coefficient matrix (in the context of linear systems)
  - REF, RREF (of a matrix)
  - pivot position (aka position of leading one)
– parametric vector form (of a solution to a system)
– standard matrix of a linear transformation

Here are theorems whose content you should understand well. You will not be asked to write
these theorems word for word on the exam, so you do not need to memorize their exact
statements, but knowing these results will help you solve some of the exam questions:

• Theorems that we learned after Midterm One:
  – Thm 3 on page 169
  – Thm 4 on page 171
  – Thm 5 on page 172
  – Thm 6 on page 173
  – Thm 7 on page 177
  – Thm 9 on page 180
  – Thm 7 on page 216
  – Thm 12 on page 227
  – Thm 14 on page 233
  – Thm (IMT continued) on page 235

• Theorems that we learned before Midterm One (you know these already ¯\_\_\_):  
  – Thm 4 on page 37
  – Thm 7 on page 58
  – Thm 8 on page 59
  – Thm 10 on page 71
  – Thm 11 on page 76
  – Thm 12 on page 77
  – Thm 8 on page 112