Linear independent functions

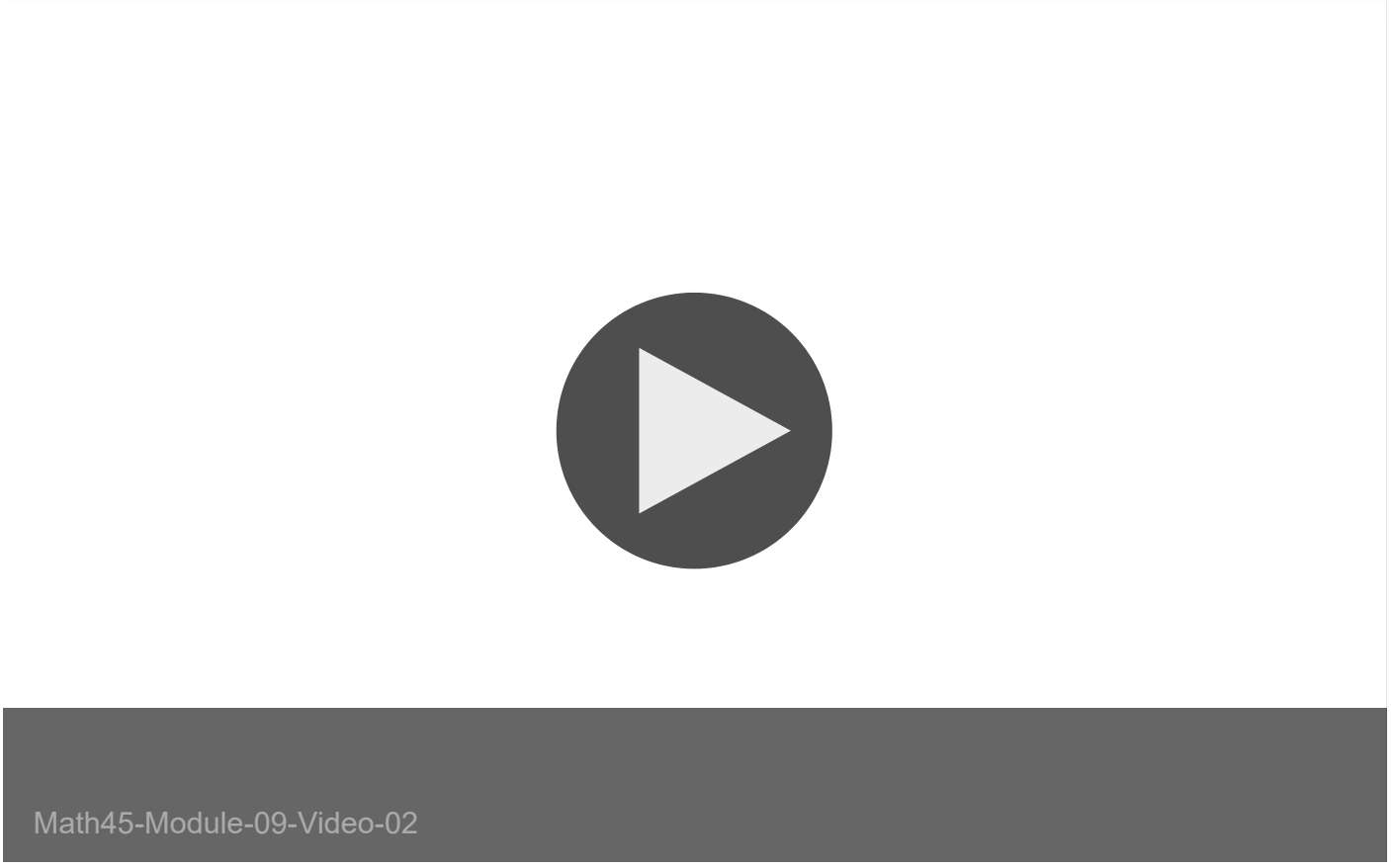
Given a set of functions, we want to eliminate redundancy. What we mean but this is that if we can create one of the functions from the others (as a linear combination!), we don't need it. This leads to the following definition.

Definition

- We say the set of function $y_1, y_2, \ldots, y_n$ is **linearly independent** if the *only* constants $c_1, c_2, \ldots, c_n$ for which the equality $c_1 y_1 + c_2 y_2 + \cdots + c_n y_n = 0$ holds is $c_1 = c_2 = \cdots = c_n = 0$.
- If the set of functions $y_1, y_2, \ldots, y_n$ is not linearly independent, it is called **linearly dependent**.

The definition of linearly independent above is very useful for computation (though it may not look that way). However, it is not clear what it's meaning is. The idea is that if the functions are linearly independent, then you can *not* solve $c_1 y_1 + c_2 y_2 + \cdots + c_n y_n = 0$ for any of the functions in terms of the others. I.e., you could not express any of the functions as a linear combination of the other.

Discussion, comments, and examples:



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WeBWorK module 09 exercises:

- Problems 2

Relevant Wikipedia articles:

- **Linear independence** **(https://en.wikipedia.org/wiki/Linear_combination#Linear_independence)**