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|  | Lecture Notes | 23rd May 2023 |

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**Theory**:

**ODE with constant coefficients**

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First, let us consider the homogeneous case;

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Discussion:

Remark:

Any homogeneous ODE of order n has exactly n good/basis solutions such as y1, y2, …, yn and the general solution can be written as;

Now, let us consider n = 2;

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Using the remark, this ODE has two basis/good solutions (say y1 and y2)

Maybe one of them looks like

Let us check to see if we can find such a ‘λ’

Substitute in the ODE

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Now, there are 3 cases;

Case 1: ;

Case 2: ;

Case 3: ;

**Solve the following**:

Example 1:

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Characteristic equation:

;

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Example 2:

**-----------------------------------------------------------------------------------------------------------------------------**

Characteristic equation:

, 2

;

**-----------------------------------------------------------------------------------------------------------------------------**

Example 3:

**-----------------------------------------------------------------------------------------------------------------------------**

Characteristic equation:

;

Example 4:

**-----------------------------------------------------------------------------------------------------------------------------**

Characteristic equation:

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Example 5:

**-----------------------------------------------------------------------------------------------------------------------------**

Characteristic equation:

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Example 6:

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Characteristic equation:

Example 7:

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