

**Reading Assignment:** Chapter 3 in *Electric Circuits, 9<sup>th</sup> Edition* by Nilsson

## Dependent Sources

Dependent sources are sources whose values *depend* on other circuit variables, such as a voltage or a current elsewhere in the circuit.

There are 4 types of dependent sources:

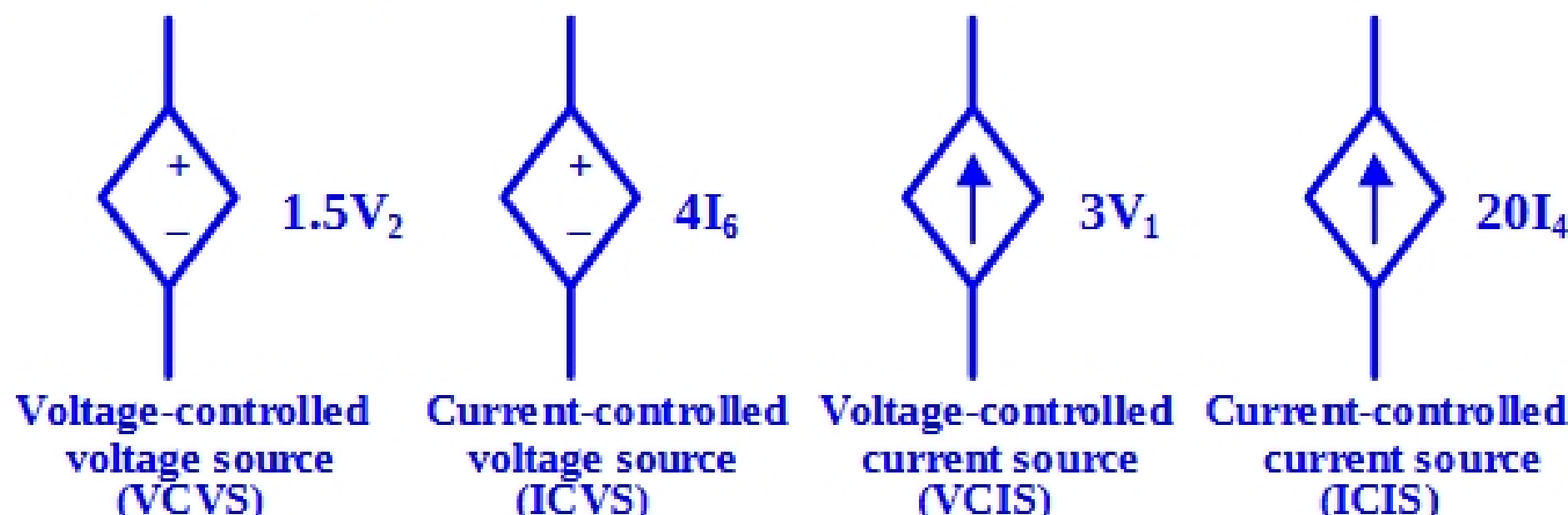
Voltage-controlled voltage source – a voltage source whose values depends on some other voltage in the circuit

Current-controlled voltage source – a voltage source whose values depends on some other current in the circuit

Voltage-controlled current source – a current source whose values depends on some other voltage in the circuit

Current-controlled current source – a current source whose values depends on some other current in the circuit

Examples of each type of dependent source:



## When are Dependent Sources Used?

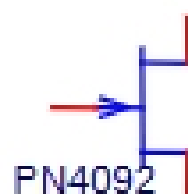
- Dependent sources are not sources that you might buy from an electronics store.
- They are mathematical models that are needed because some circuit devices act like dependent sources at times. For example, dependent sources are commonly used to model transistors and operational amplifiers.

**Examples:** Show a model that is commonly used for each device below.

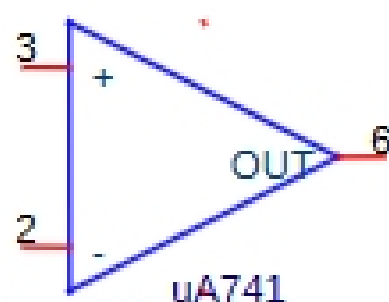
Circuit Devices:



**Bipolar Junction Transistor (BJT)**



**Field Effect Transistor (FET)**



**Operational Amplifier**

Model:

**Example:** Solve for  $I_1$  and  $I_2$  in the circuit shown below.

