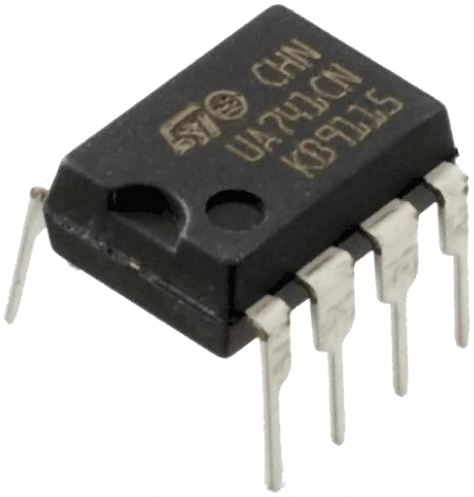
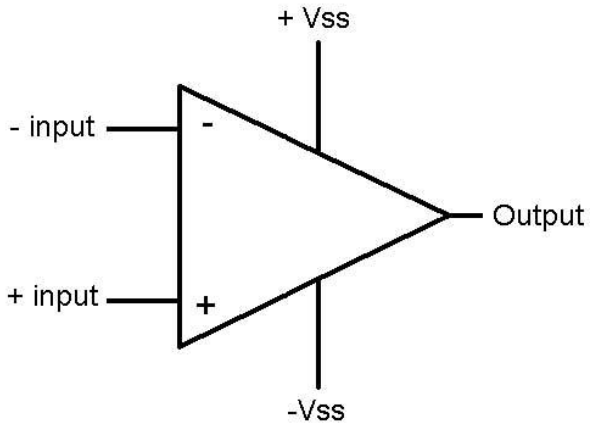
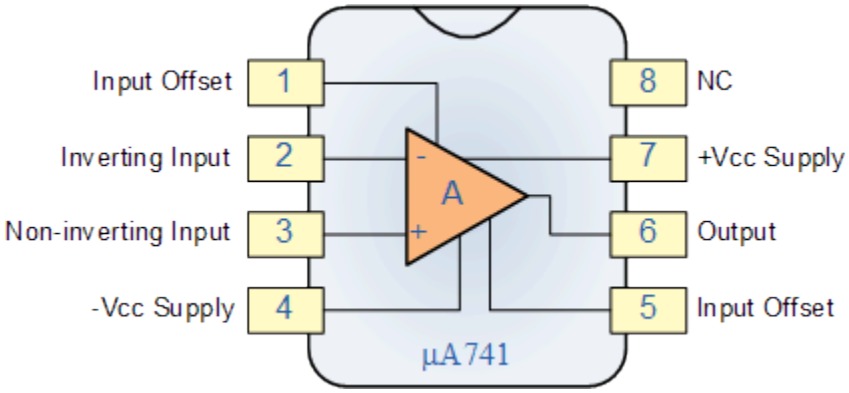
EN-3212 Electronics

Introduction to Operational Amplifiers

The following device is called an operational amplifier, or op-amp for short. Next to it is the schematic diagram symbol for it. Below those, you will find a diagram referred to as a pinout. It should help you connect the two.







There is a Class A Amplifier inside the amplifier along with a few other types of amplifiers (you can look these up in your book). That's why devices like this one are called integrated circuits or ICs. We're going to look at how we can use operational amplifiers to convert one voltage range, coming out of one of our sensor circuits, to a different voltage range. We're doing this so that we can connect our sensor to a device called an Analog to Digital Converter or AD converter for short. The AD converter will be attached to whatever it is that you are using for a control device.

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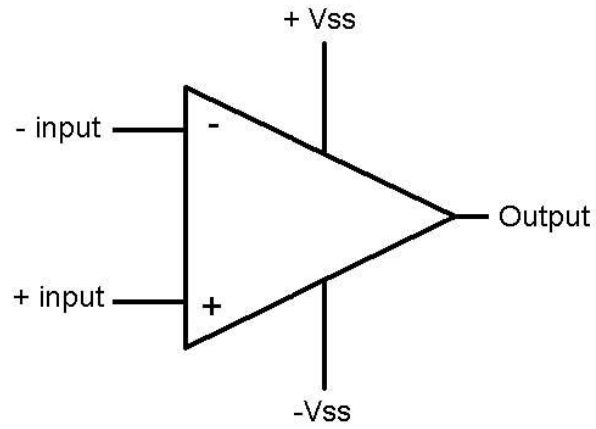
Write down the following definitions along with some additional information about how the device works.



Inverting input (-input):

Non-inverting input (+input):

Output (Vout):

+Vss:

-Vss:

How the op-amp works:

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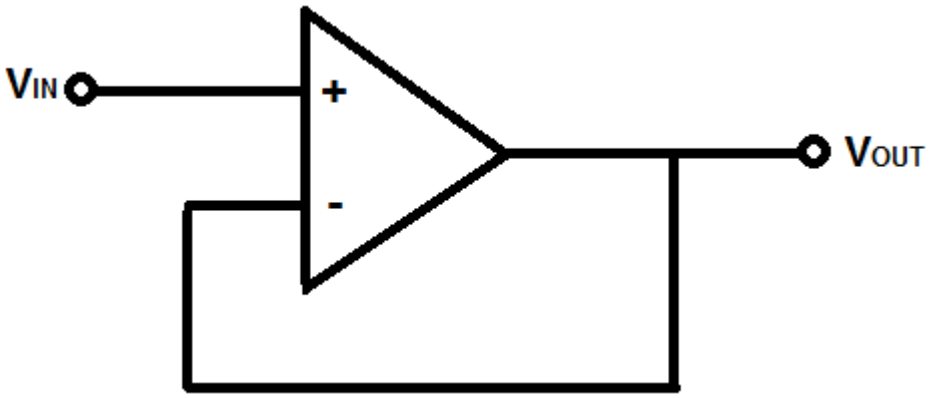
The operational amplifier isn't a very useful device unless we use something called "negative feedback". Notice that the output is connected to the inverting input. Try to remember how we derived the output in lecture.



What is the gain of the voltage follower?

Why would you use a voltage follower in a circuit?

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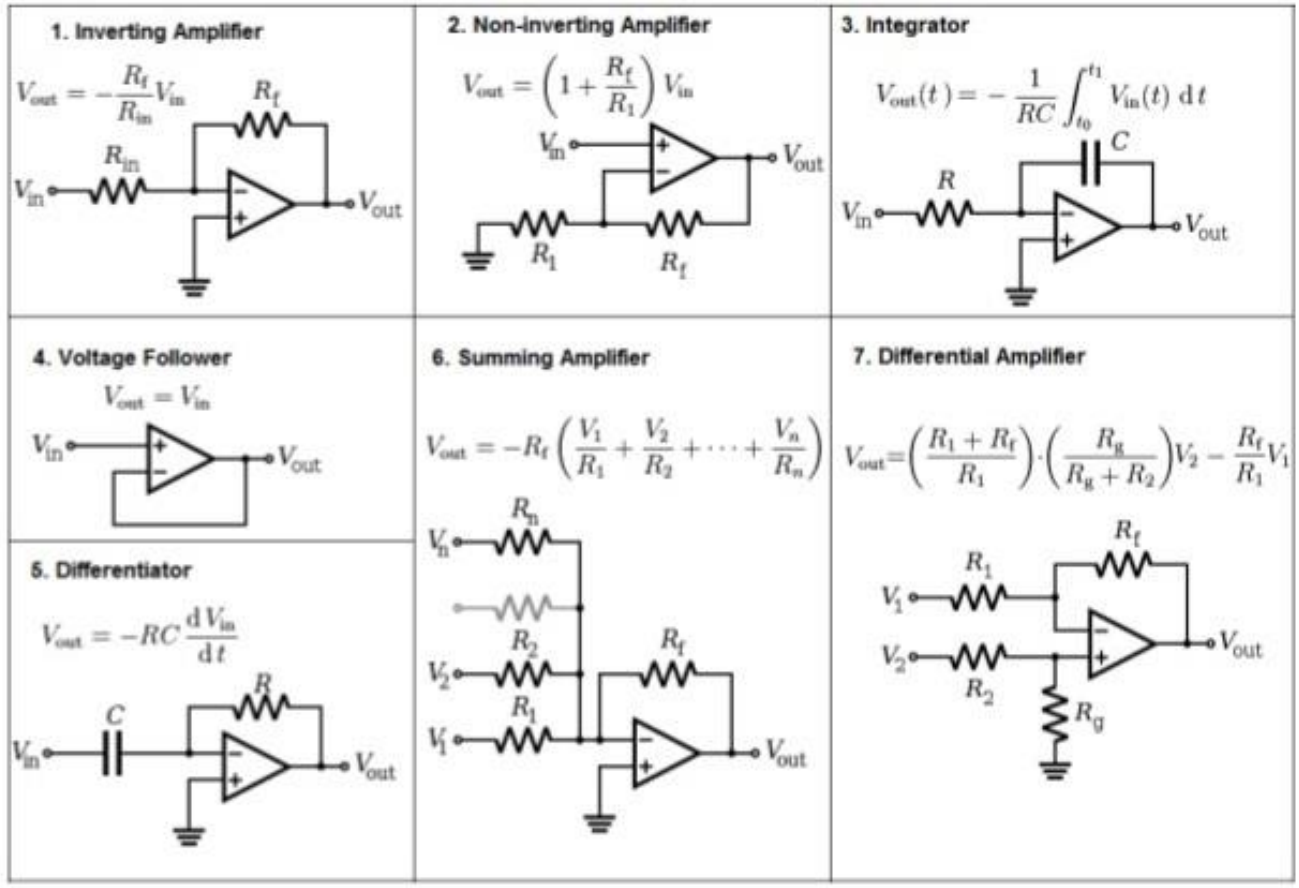
Here are a few more important op-amp configurations:

OP-AMP Configuration and their Outputs



Don't worry about 5 and 6 for now. The rest you should memorize.

Try the following for practice.

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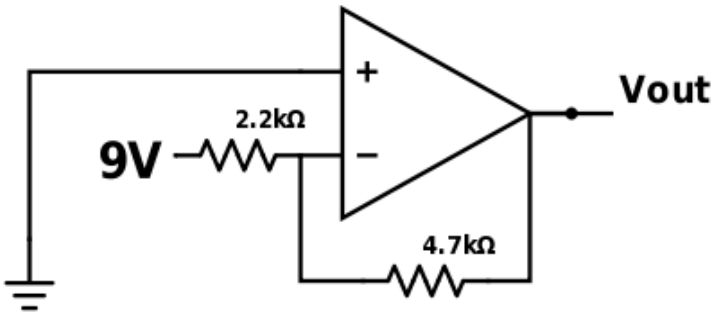
Identify the type of amplifier. Calculate the gain of the amplifier. Find Vout.



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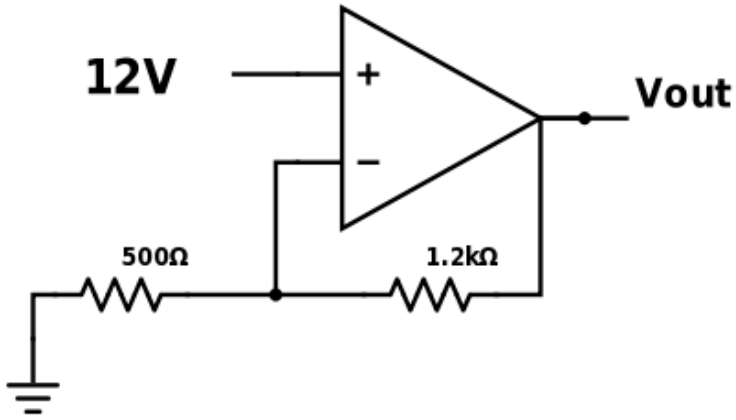

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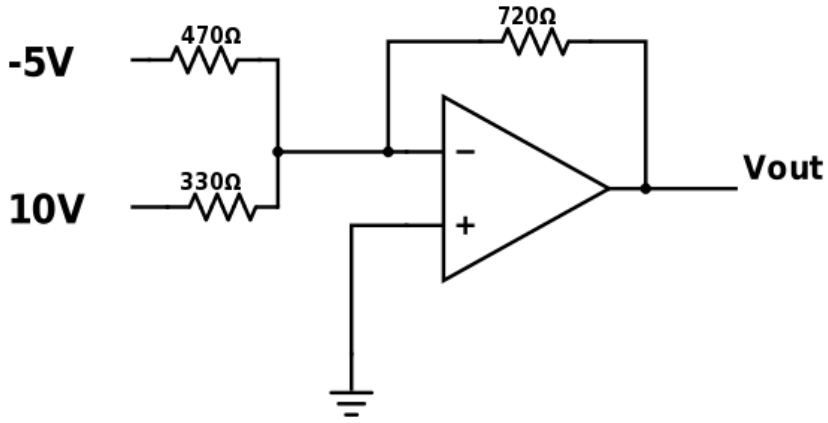
Identify the type of amplifier. Find Vout.



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Find Vout.