Lab 7 – Results: Operational Amplifiers

*ECE203: Electrical Circuits II*

|  |  |  |
| --- | --- | --- |
| Name | Student ID | CCID |
|  |  |  |

# Inverting Amplifier

## Changing Rf

VIN = 100mVpeak @ 5kHz

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **R1** *(Ω)* | **Rf** *(Ω)* | **VIN***(mVpp)* | **VOUT** *(mVpp)* | **Gain** | **Gain (ideal)** |
| 1000 | 470 |  |  |  |  |
| 1000 | 1000 |  |  |  |  |
| 1000 | 4700 |  |  |  |  |
| 1000 | 10000 |  |  |  |  |
| 1000 | 20000 |  |  |  |  |

## **Increasing Vin**

f = 5kHz

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **R1** *(Ω)* | **Rf** *(Ω)* | **VWavegen** *(V)* | **VIN** *(mVpp)* | **VOUT***(mVpp)* | **Gain** | **Gain (ideal)** |
| 1000 | 4700 |  |  |  |  |  |
| 1000 | 4700 |  |  |  |  |
| 1000 | 4700 |  |  |  |  |
| 1000 | 4700 |  |  |  |  |
| 1000 | 4700 |  |  |  |  |
| 1000 | 4700 |  |  |  |  |

## **Increas**ing Frequency

VIN = 500mVpeak

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **R1** *(Ω)* | **Rf** *(Ω)* | **F** *(Hz)* | **VIN** *(mVpp)* | **VOUT** *(mVpp)* | **Gain** | **Gain (ideal)** |
| 1000 | 4700 | 100 |  |  |  |  |
| 1000 | 4700 | 300 |  |  |  |
| 1000 | 4700 | 1000 |  |  |  |
| 1000 | 4700 | 3000 |  |  |  |
| 1000 | 4700 | 10000 |  |  |  |
| 1000 | 4700 | 30000 |  |  |  |
| 1000 | 4700 | 100000 |  |  |  |
| 1000 | 4700 | 300000 |  |  |  |
| 1000 | 4700 | 1000000 |  |  |  |
| 1000 | 4700 | 3000000 |  |  |  |

## Input Resistance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rsense** *(Ω)* | **VW1** *(V)* | **VIN** *(V)* | **VRsense** *(mV)* | **IIN** *(uA)* | **RIN** *(Ω)* |
| 470 |  |  |  |  |  |
| 1000 |  |  |  |  |  |
| 4700 |  |  |  |  |  |

## Output Resistance

|  |  |  |
| --- | --- | --- |
| **RLoad** *(Ω)* | **VOUT** *(V)* | **ROUT** *(Ω)* |
| open |  | NA |
| 470 |  |  |
| 1000 |  |  |
| 4700 |  |  |

# Non-inverting Amplifier

## Changing Rf

VIN = 100mVpeak @ 5kHz

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **R1** *(Ω)* | **Rf** *(Ω)* | **VIN** *(V)* | **VOUT** *(V)* | **Gain** | **Gain (ideal)** |
| 1000 | 470 |  |  |  |  |
| 1000 | 1000 |  |  |  |  |
| 1000 | 4700 |  |  |  |  |
| 1000 | 10000 |  |  |  |  |
| 1000 | 20000 |  |  |  |  |

## Input Resistance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rsense** *(Ω)* | **VW1** *(V)* | **VIN** *(V)* | **VRsense** *(mV)* | **IIN** *(uA)* | **RIN** *(Ω)* |
| 20000 |  |  |  |  |  |

The following pages have been left for you to include the plots that you are required to create as part of your post-lab.

To create your plots you can use whichever software you would like (Excel, Matlab, etc), export your plot as an image and import it into your Lab 7 - Results sheet in the appropriate place.

Your plots should include:

* A Plot title
* Label your axes and show what unit of measure is used.
* Include a marking for your data-points.
* Include a line between your data-points in the same series.
* Include a legend.
* Make sure your scales are appropriate and visible.

# Inverting Amplifier: Changing Rf

< Insert your plot here >

Delete all the light grey text and insert your plot.

Inverting Amplifier - Changing Rf: Plot both the measured gain and ideal gain vs. the feedback resistance (Rf).

# Inverting Amplifier: Increasing VIN

< Insert your plot here >

Delete all the light grey text and insert your plot.

Inverting Amplifier - Increasing VIN: Plot both the measured gain and ideal gain vs. the input voltage (Vin).

# Inverting Amplifier: Increasing f

< Insert your plot here >

Delete all the light grey text and insert your plot.

Inverting Amplifier - Increasing f: Plot both the measured gain and ideal gain vs. the applied frequency (f) – Use a log scale for the x axis.

# Non-inverting Amplifier: Changing Rf

< Insert your plot here >

Delete all the light grey text and insert your plot.

Non-inverting Amplifier – Changing Rf: Plot both the measured gain and ideal gain vs. the feedback resistance (Rf).