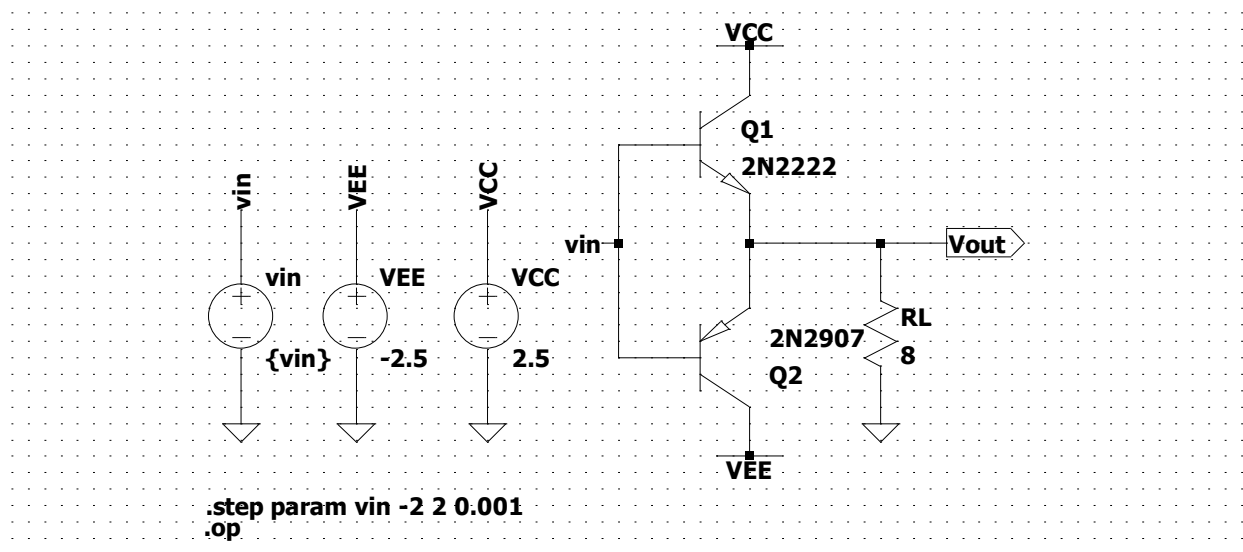


4th QUESTION IS REALIZED USING LTSPICE

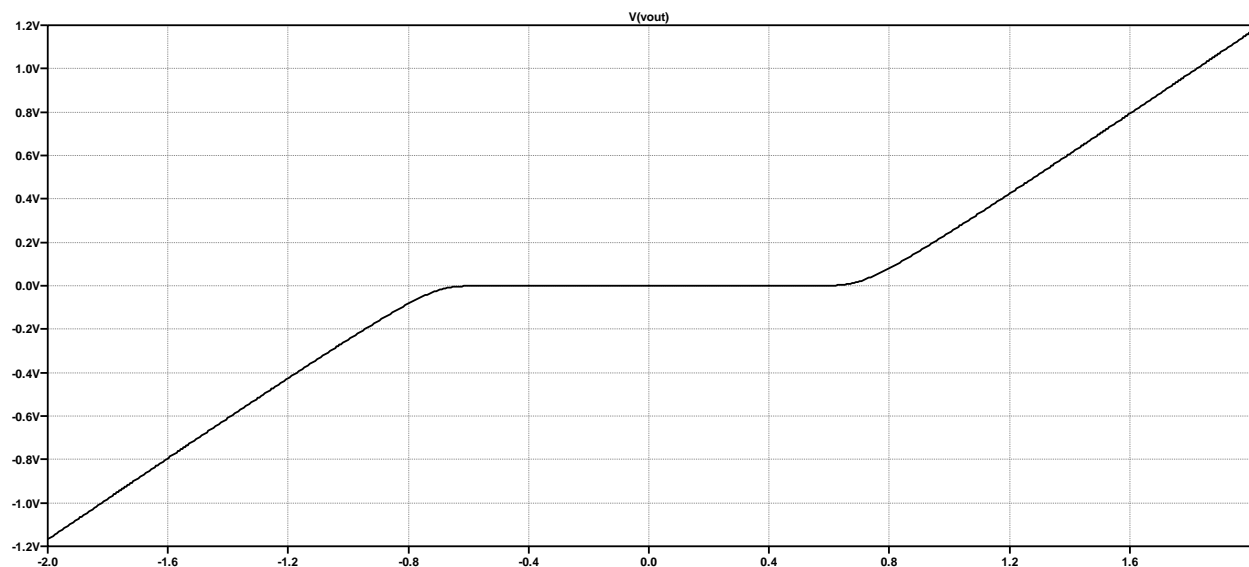
First of all, the circuit is drawn:



$R_L = 8 \Omega$

In order to see how the output of the circuit responds changes in input voltage, lets sweep some input voltage from -2V to 2V by using the command `.step param vin -2 2 0.001` and `.op`

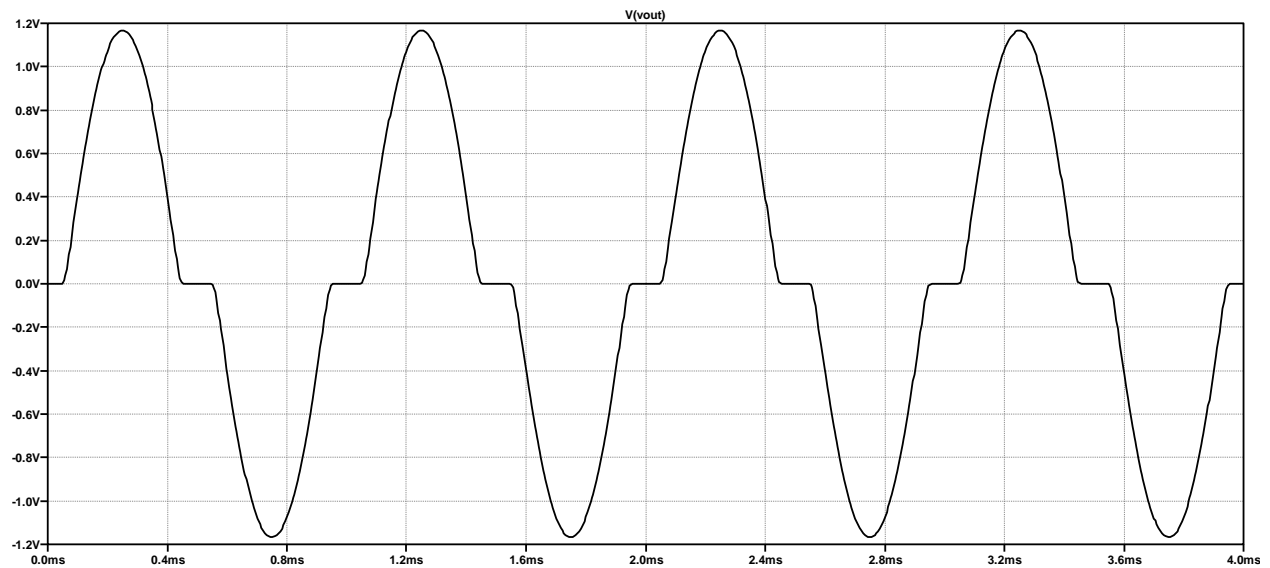
The graph is shown as:



As it can be seen from this graph, for some input voltage values the output voltage becomes zero and the characteristic is not linear. Not being linear will introduce some harmonics to the amplified signal and therefore the audio or the output signal will be distorted (will be in different shape form from the input voltage).

To see the crossover distortion(harmonics) let's do transient analysis for an input sinusoid with 2V peak amplitude and 1 kHz frequency.

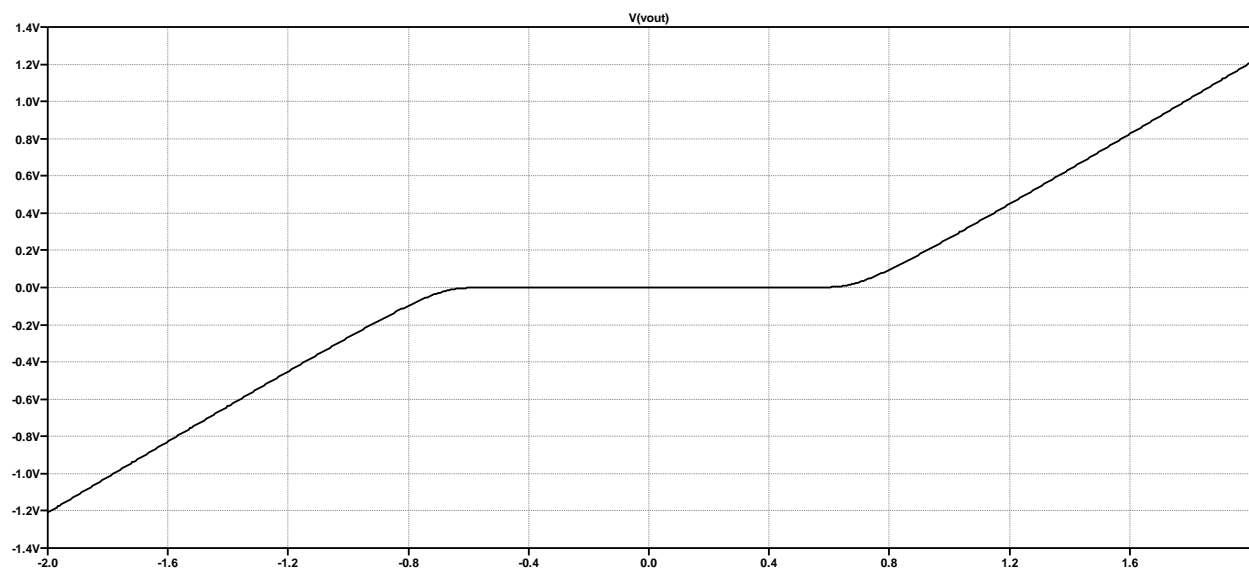
The plot is given as:



As it can be seen from this graph, the output signal is not sinusoid anymore which is not desirable and will introduce some higher frequencies into the signal.

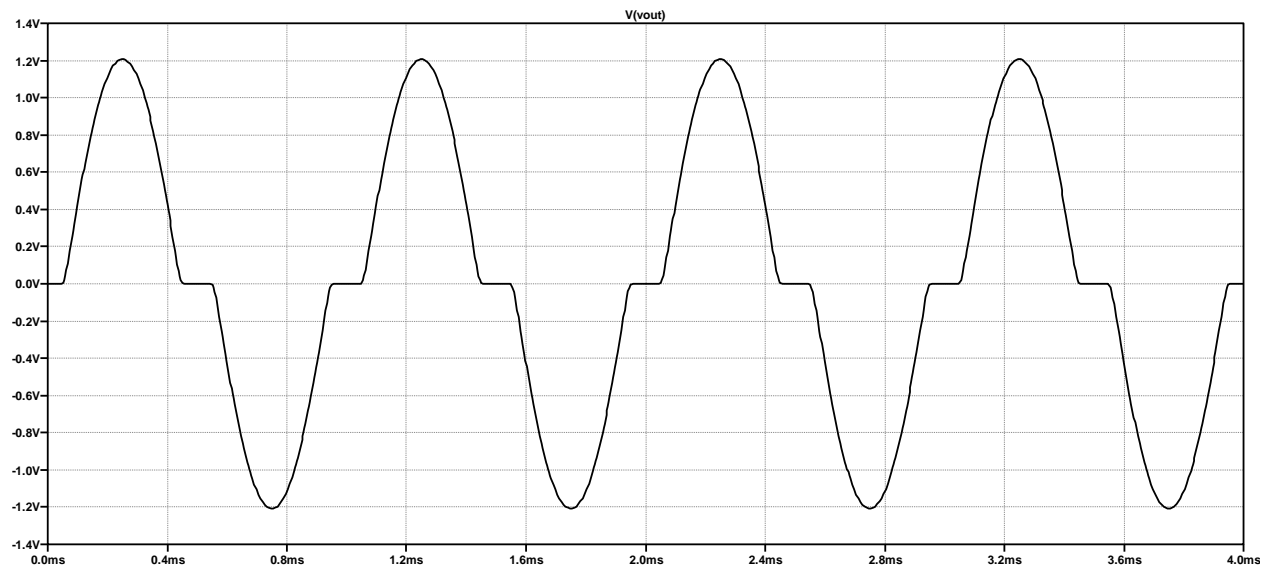
$$RL = 16 \, \Omega$$

Now let's increase the load resistance a bit and see what happens. Let's begin with linearity



Nothing changes much. Let us also analyze the circuit by transient analysis

The transient analysis for the same input sinusoid (2V peak amplitude and 1 kHz frequency) as given:



Very little changes occur in the amplitude but negligible. On the other hand in shape-wise if we increase the load resistance to $16\ \Omega$, No big changes occur.