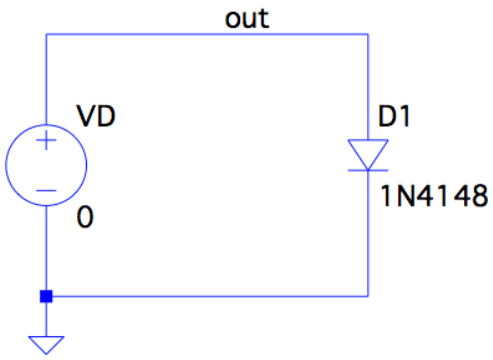
The purpose of this laboratory is:

Model and simulate the DC characteristic of diodes and observe and quantify how the diode's behavior is affected by temperature.

Pre-Lab:

Using the 1N4148 diode model provided by LTSPICE, plot the ID vs. VD curve of the diode in FORWARD and REVERSE region at room temperature.

Room temperature = _____



What is the default temperature (TNOM) used by SPICE simulation? _____

What is the unit of temperature used by SPICE? _____

What type of Analysis do you need to use for plotting the ID vs. VD curve of the diode? _____

Write down the SPICE directive you used to obtain your plot. _____

What is a reasonable range of VD values over which plot the ID characteristic? _____

Write down the SPICE directive you used to obtain your plot. _____

Compare qualitatively your plots with the information provided by the diode Data Sheet:

Does the model provided seem to capture the forward region behavior adequately? _____

Does the model provided seem to capture the reverse region behavior adequately? _____

Does the model provided seem to capture the reverse breakdown region behavior adequately? _____

Lab:

Modify your Prelab circuit to use the following model rather than the default one provided by LTSPICE:

```
.model D1N4148 D (IS=0.1PA, RS=16 CJO=2PF TT=12N BV=100 IBV=0.1PA)
```

Plot the ID vs. VD characteristic of the diode in forward region, reverse region, and reverse breakdown region at three different temperatures: –50 centigrade, 25 centigrade and 50 centigrade.
HINT: to change temperature use the parametric analysis command .STEP

1. Attach the plot. Make sure to clearly label the three curves with the corresponding temperature.

2. Determine the forward temperature coefficient $dV_D/dT \approx \Delta V_D/\Delta T$.

   What is the forward temperature coefficient of the diode?

Diode	Temperature coeff. [units]	I_D[units]	ΔV_D[units]	ΔT [units]
1N4148				

   Shortly explain/show how it was computed using your graphs.

   Compare your graphically determined results to the well-known theoretical equation:

$$dV_D/dT \approx -2 \text{ mV/°C}$$

   %Error = 100 x (measured – theoretical) / theoretical =
   _____

3. Measure the reverse breakdown voltage. Does the breakdown voltage increase, decrease, or remain constant when temperature increases? _____

Diode Type	V_{BR} [units] at –50 °C	V_{BR} [units] at 25 °C	V_{BR} [units] at 50 °C
1N4148			