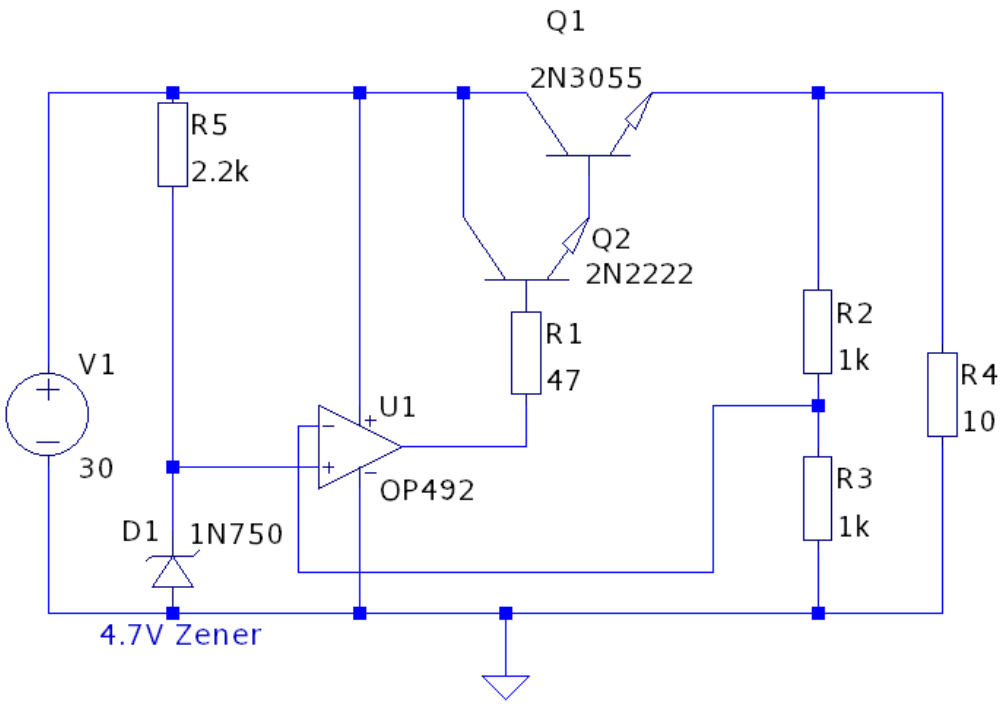
Lab 2 DC power supplies

1) The positive linear voltage regulator.



This circuit is available in the LTSpice model Linear1

The example above produces a nominal output voltage of 9.4V. This is achieved by using a 4.7V zener diode as a reference voltage and by using R2 and R3 to provide 50% feedback of the output voltage. The table below lists as set of input and output parameters for you individually. Your tasks are as follows:

1) Calculate suitable values for R1 and R2 to achieve the desired results.

2) Calculate $\frac{\Delta V_o}{\Delta V_i}$ for a 10% drop in the input voltage.

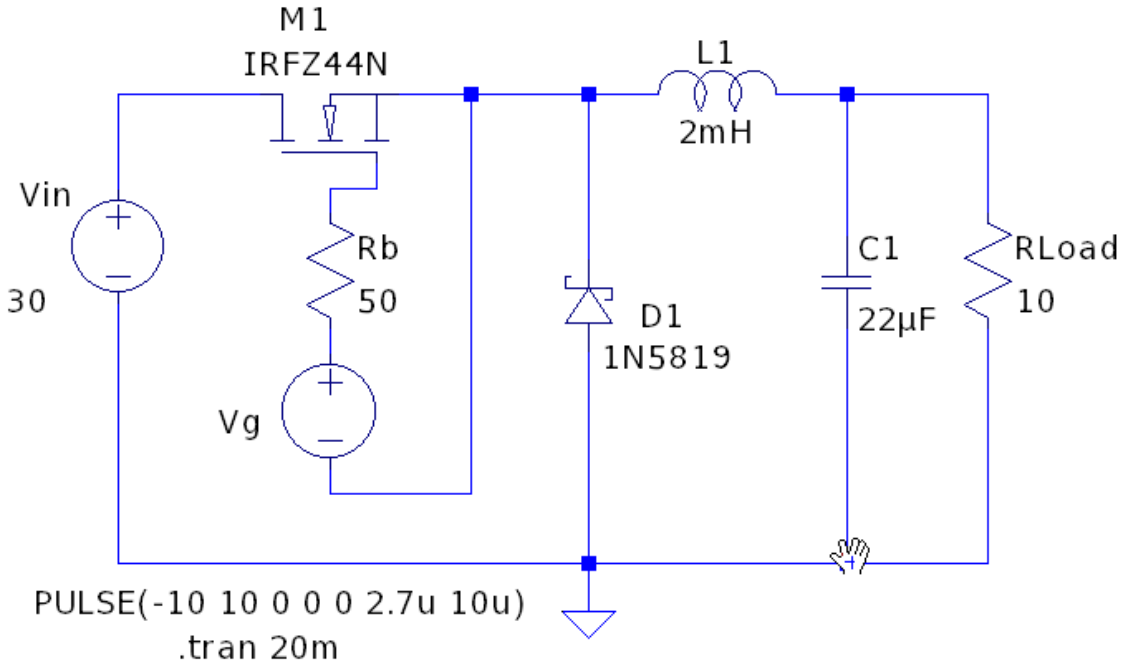
3) Calculate the load regulation for your circuits as follows:

$$Load\ Regulation = \frac{V_{out(noload)} - V_{out(full\ load)}}{V_{out(half\ load)}}.100\%$$

4) The efficiency at full load current.

	Vo	Io (full load)	Vi
Carmen Boupda Mekamgho	8	1	30
Mark Digan	12	1	30
Sean Doorly	14	1	30
Erika German	16	1	30
Conor Goodrich	18	1	30
Cillian Martin	7	2	24
Alessio Persechini	9	2	24
Eoghan Ryan	11	2	24
Vanesa Sorecau	13	2	24
Talha Tallat	15	2	24
Arthur Trousseau	17	2	24

2) The step-down switching regulator



This circuit is available in the LTSpice model Buck1

The circuit shown above is a step-down (buck) regulator. L1 and C1 filter the output voltage and ripple to satisfy particular design requirements. The gate drive for M1 is obtained from a pulsed voltage source. Your tasks are as follows:

1) Determine a suitable high pulse width time for Vg to achieve the desired output voltage.
2) Calculate suitable values for L1 and C1 to achieve your personal design specification (see table).
3) Take screen shots of inductor current and load voltage to show specification has been met
4) Estimate the efficiency of your circuit at the nominal output current.

	Vi	Io	Vo	% current ripple	% voltage ripple
Carmen Boupda Mekamgho	30	1	18	10	10
Mark Digan	30	1.2	19	20	20
Sean Doorly	30	1.4	20	10	10
Erika German	30	1.5	21	20	20
Conor Goodrich	30	1.6	22	10	10
Cillian Martin	30	2	23	20	20
Alessio Persechini	24	1.1	11	10	10
Eoghan Ryan	24	1.3	12	20	20
Vanesa Sorecau	24	1.5	13	10	10
Talha Tallat	24	1.7	14	20	20
Arthur Trousseau	24	1.9	15	10	10