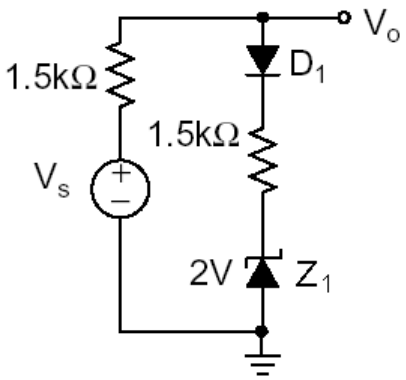
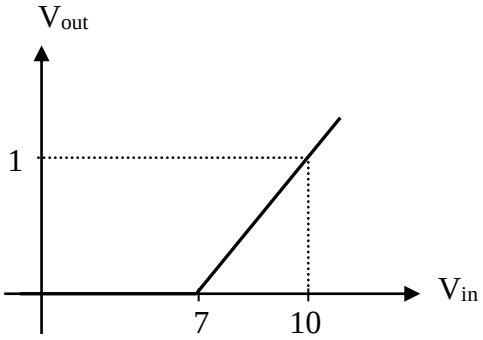
EE2032 Electronics Quiz#4

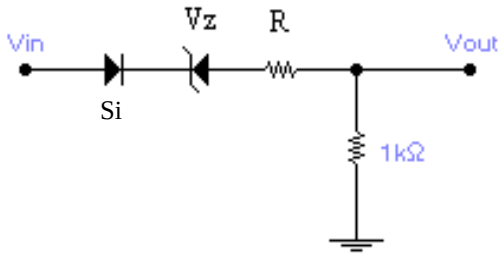
Mar. 13, 2019

1) In the circuit shown, the diode is (0.7 Volt) ideal, the zener is rated at 2 V, and Vs is changing from 0 to 5 Volts. Show all your calculations, find the transfer function, and carefully draw Vo as a function of Vs.

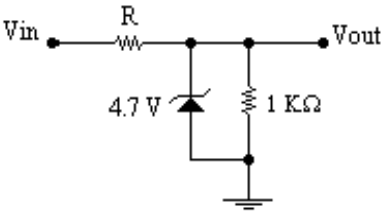


2) We would like to obtain the following V_{in} - V_{out} characteristic with the circuit given.
a) Find suitable Vz and R values.
b) If each element in the circuit can withstand upto 0.25W, what is the maximum input voltage?

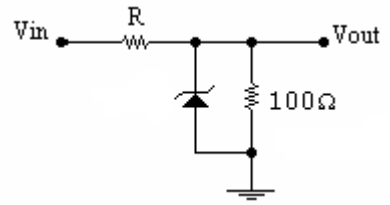




3) Consider the voltage regulator (or voltage reference) circuit. The zener diode has maximum power P_{ZM}=0.25 W. To keep Vout=4.7 V. for the input voltage rage 9<Vin<20, what must be the range of the resistor R?



4) For the zener regulator circuit shown, V_{in} is 12 Volts and V_{out} must be maintained at 5 Volts.
a) How should the zener voltage and power be chosen if R=100Ω?
b) If we use a 1-W zener diode, How should the R value be selected?



5) Consider the voltage regulator circuit for keeping V_{out} =7 V. The zener diode has the maximum power of P_{ZM}=0.5 W.
a) What must be the range of the load resistor R2, if R1=100 Ω and V_{in}=10 V?
b) What must be the range of the load resistor R2, if R1=30 Ω and V_{in}=10 V?
c) Carefully calculate and show all valid R1-R2 region <u>in detail</u> assuming V_{in}=10 V.
(Use the horizontal axis R1 for the values R1>0, and the vertical axis R2 for R2>0 in a two dimensional plot. The region and the bordering functions must be clearly indicated in detail.)