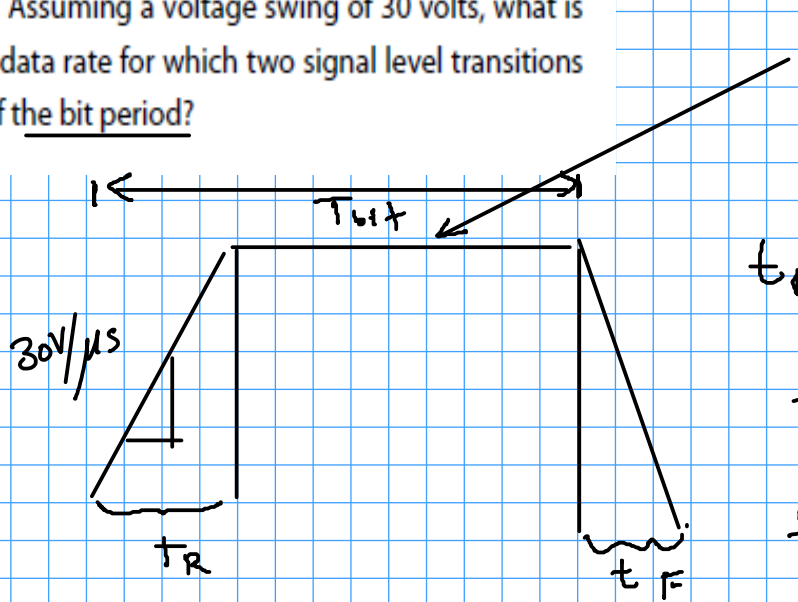
ELEX 4340 Lecture 6 - Line Drivers/Receivers

Exercise 1: The RS-232 standard specifies a maximum slew rate of 30V/μs. Assuming a voltage swing of 30 volts, what is the maximum data rate for which two signal level transitions occupy 10 % of the bit period?



$t_R + t_F = 10\%$ of T_{bit}

$t_R = \frac{\Delta Y}{slope} = \frac{30V}{30V/\mu s} = 1\mu s$

$t_F = 1\mu s$

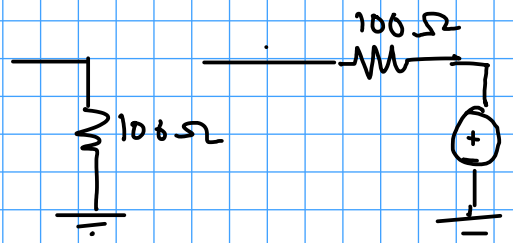
$slope = \frac{\Delta Y}{\Delta X}$

$\Delta X = \frac{\Delta Y}{slope}$

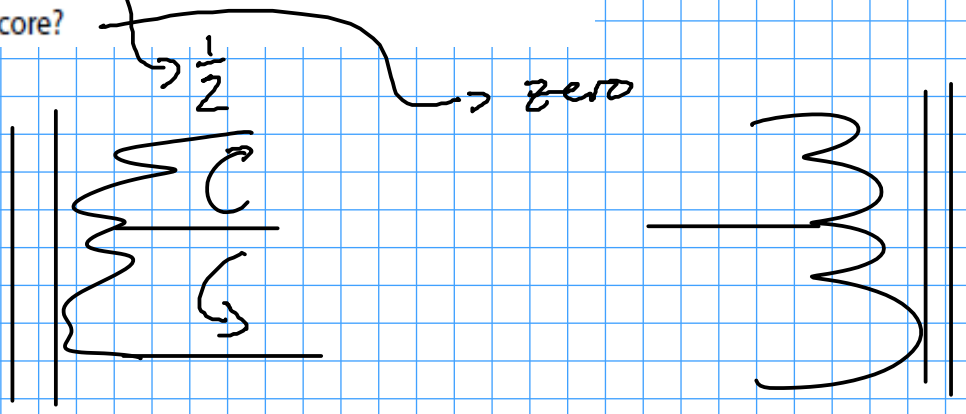
$t_R + t_f = 0.1 T_{bit}$

$T_{bit} = \frac{1+1}{0.1} = \frac{2}{0.1} = 20\mu s$

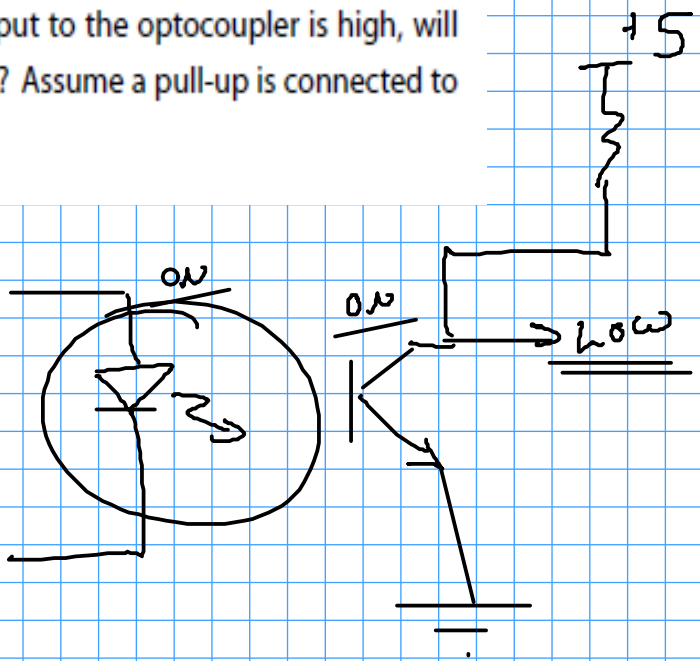
$f_{bit} = \frac{1}{T_{bit}} = 50\ kHz$

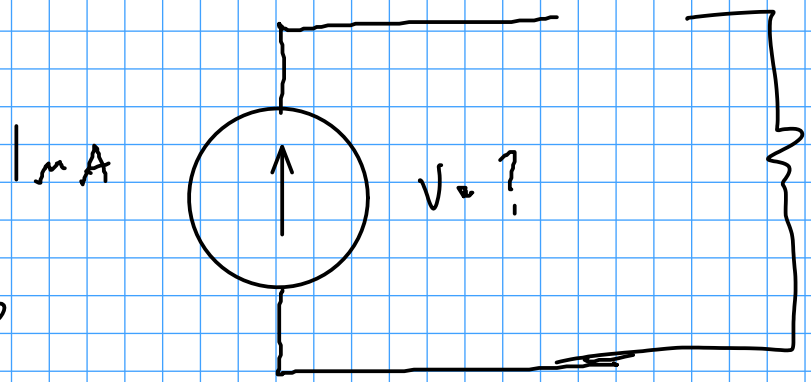


Exercise 2: If the common-mode circuit is used to carry 500mA, how much current flows through each half of the transformer secondary? What is the net effect on the flux in the transformer core?



Exercise 3: When the input to the optocoupler is high, will the output be high or low? Assume a pull-up is connected to the output.





$R = \infty$

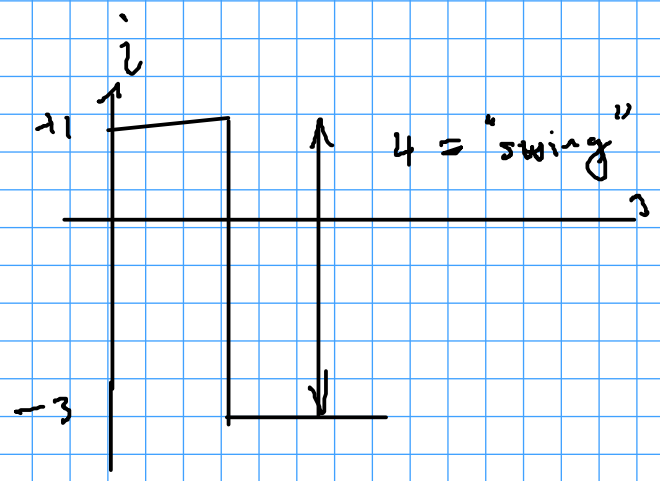
$V =$

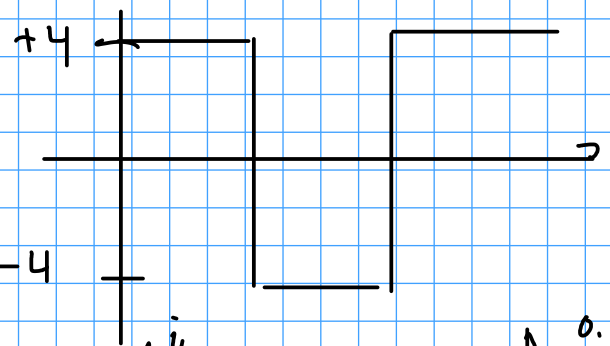
$V = iR = 1mA \cdot 10\Omega = 10mV$

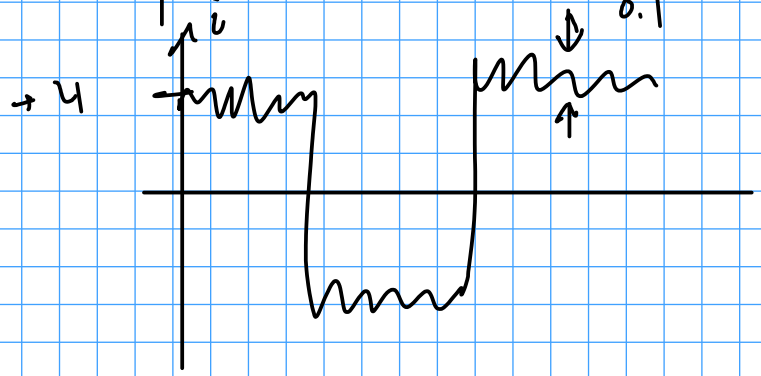
$V = iR = 1mA \cdot 1k = 1V$

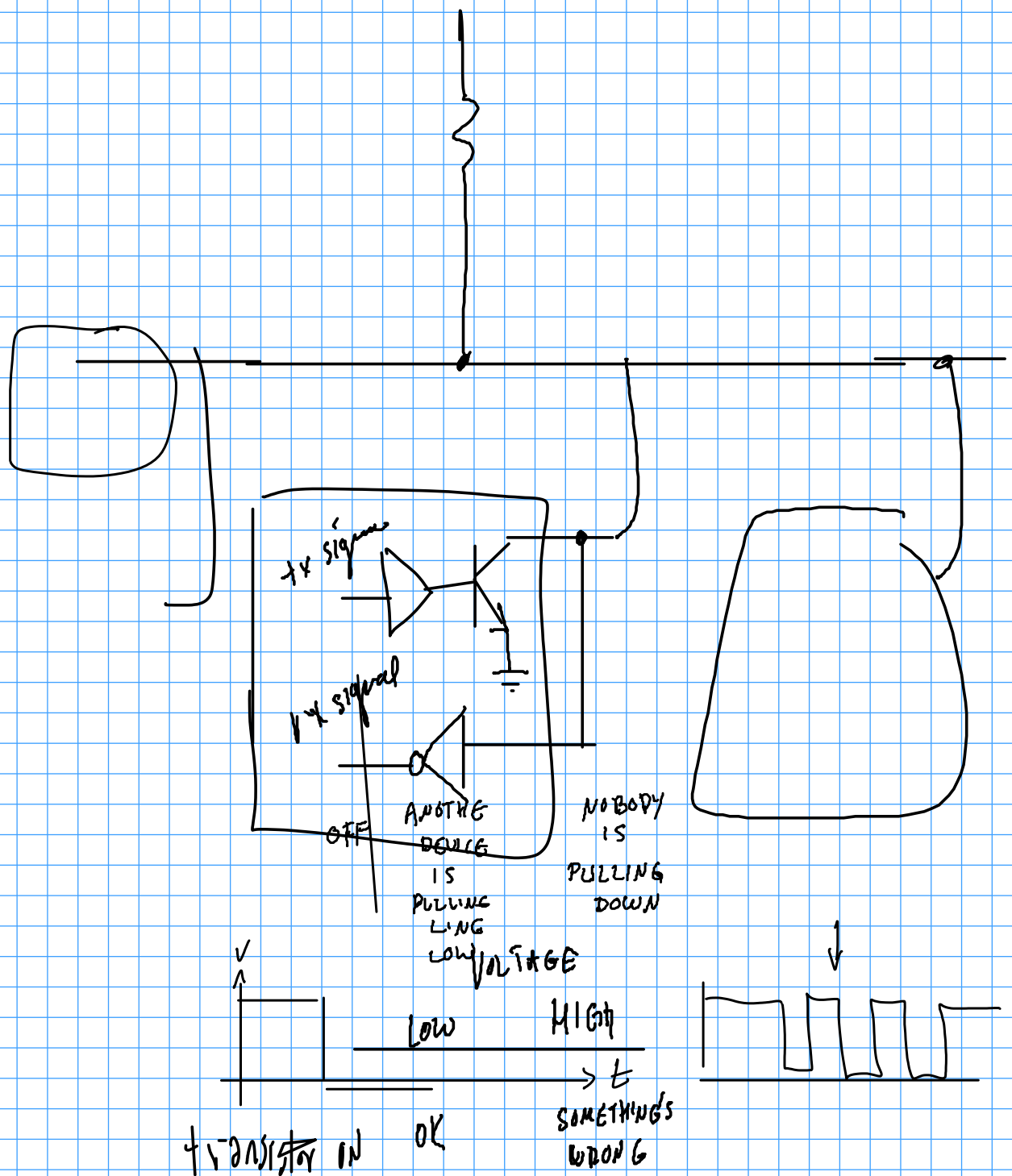
$V = iR = 0 \cdot \infty =$

"swing" = change








tx signal
rx signal
OFF
ANOTHER DEVICE IS PULLING LINE LOW
NOBODY IS PULLING DOWN
V
LOW
HIGH
t
SOMETHING'S WRONG
OK
NO RESISTOR