

Electronics II

Exercise 8

Deadline Wed 21.3.2018 12:00

1. a) Do a bitwise not on a positive integer. What is the resulting number? Explain how the microcontroller presents negative numbers on bit level. (1p)

b) Why doesn't the following code work as one might expect? How would you make the comparison work with floating point numbers? Make the modifications to the code. (1p)

```
float f = pow(sqrt(2),2);

Serial.println(f);
if(f == 2.0){
  Serial.println("True");
}else{
  Serial.println("Why do we end up here?");
}
```

2. Make the rotation of the DC motor adjustable with a potentiometer. The direction and speed is set with the potentiometer. When the potentiometer is centered the motor should be stationary (have a little deadzone). Use the L293D to drive the motor. Do not connect the motor straight to 5V as the inducted voltage spikes may damage the electronics. (2p)

3. Make a stroboscope to measure the speed of the motor (with the fan attached to it). Use a rotary encoder to make to set the frequency of an LED and LCD to display it. Have three modes for frequency control of the LED: when the rotary encoder is turned the frequency is incremented/decremented in small steps (0.1 Hz?), large steps (5 Hz?) and doubled/halved (to detect alializing). The mode is selected by the rotary encoder's button and the active mode should be indicated on the screen. Is the motor speed linearly proportional to the duty cycle? (2p)