

Lab 1: Paul Tissedre

Link to your Digital-electronics-2 GitHub repository:

<https://github.com/paul-tiss/Digital-electronics-2>

Blink example

1. What is the meaning of the following binary operators in C?

- |: Logical OR
- &: Logical AND
- ^: Logical EX-or
- ~: One's complement
- <<: Left shift
- >>: Right shift

2. Complete truth table with operators: |, &, ^, ~

b	a	b or a	b and a	b xor a	not b
0	0	0	0	0	1
0	1	1	0	1	1
1	0	1	0	1	0
1	1	1	1	0	0

Morse code

1. Listing of C code with syntax highlighting which repeats one "dot" and one "comma" (BTW, in Morse code it is letter A) on a LED:

```
int main(void)
{
    // Set pin as output in Data Direction Register
    // DDRB = DDRB or 0010 0000
    DDRB = DDRB | (1<<LED_GREEN);

    // Set pin LOW in Data Register (LED off)
    // PORTB = PORTB and 1101 1111
    PORTB = PORTB & ~(1<<LED_GREEN);

    // Infinite loop
    while (1)
    {
        // Pause several milliseconds
        _delay_ms(SHORT_DELAY*4);

        // WRITE YOUR CODE HERE
    }
}
```

```

// turn the led on for 1 second (dot)
PORTB = PORTB ^ (1<<LED_GREEN);
_delay_ms(SHORT_DELAY*4);

// turn the led off for 1 second
PORTB = PORTB & ~(1<<LED_GREEN);
_delay_ms(SHORT_DELAY*4);

// turn the led on for 3 second (coma)
PORTB = PORTB ^ (1<<LED_GREEN);
_delay_ms(SHORT_DELAY*4*3);

// turn the led off
PORTB = PORTB & ~(1<<LED_GREEN);
}

// Will never reach this
return 0;
}

```

2. Scheme of Morse code application, i.e. connection of AVR device, LED, resistor, and supply voltage. The image can be drawn on a computer or by hand. Always name all components and their values!

