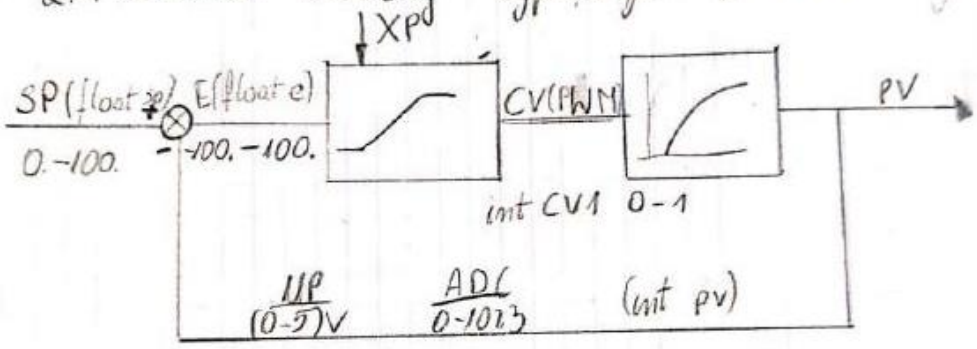
Grupa 6 Wojciech Serenis

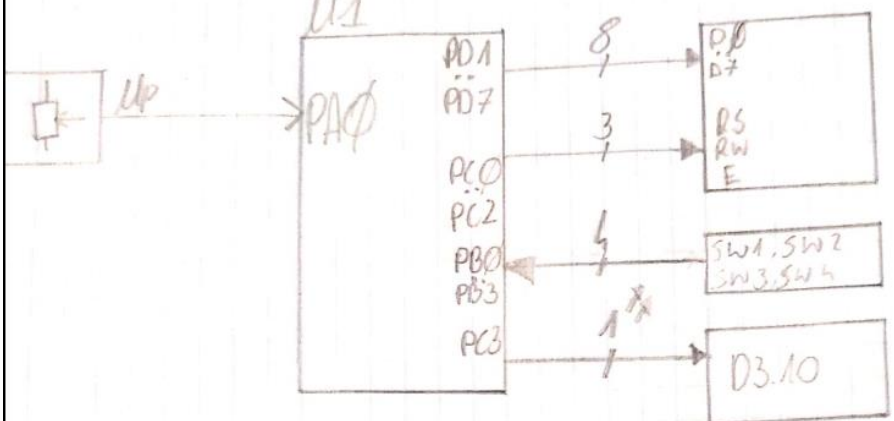
Temat: Badanie regulatora proporcjonalnego

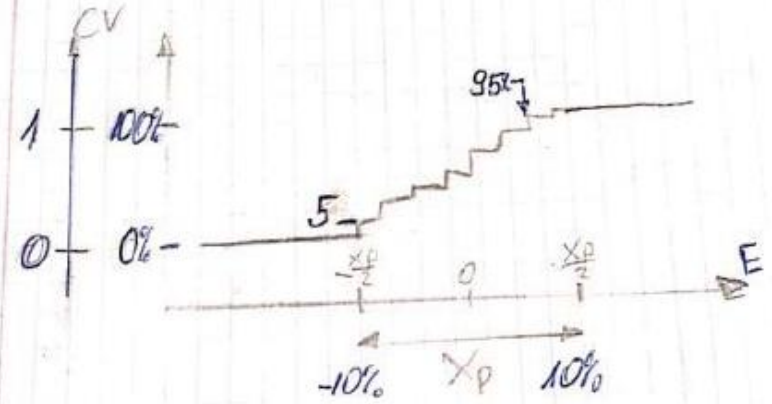
2. Zalożenia projektowe

2.1 Schemat blokowy typowego układu reg.

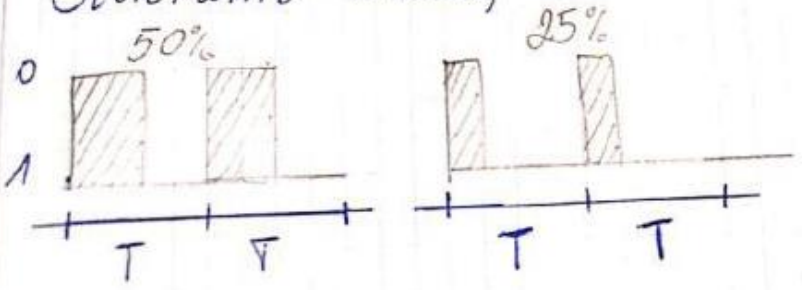


2.2 Schemat blokowy podłączenia sygnałów w układzie do badania regulatora.





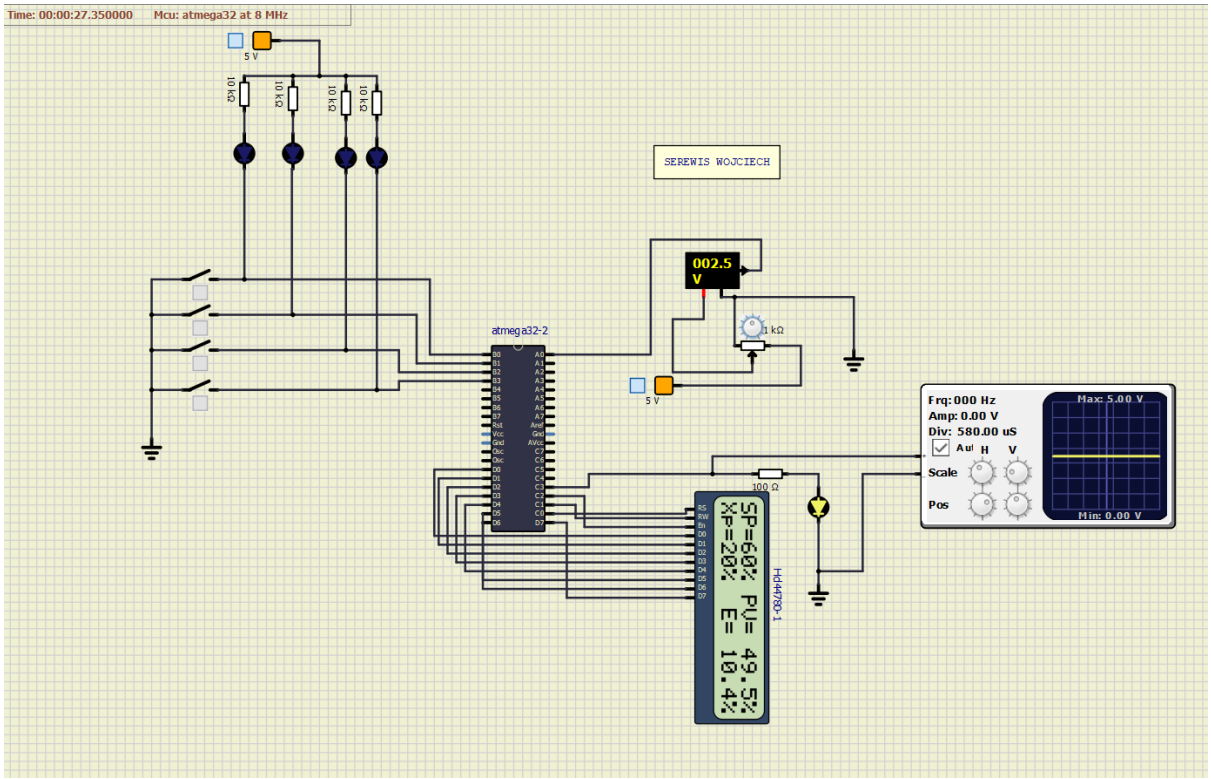
Sterowanie metodą PWM

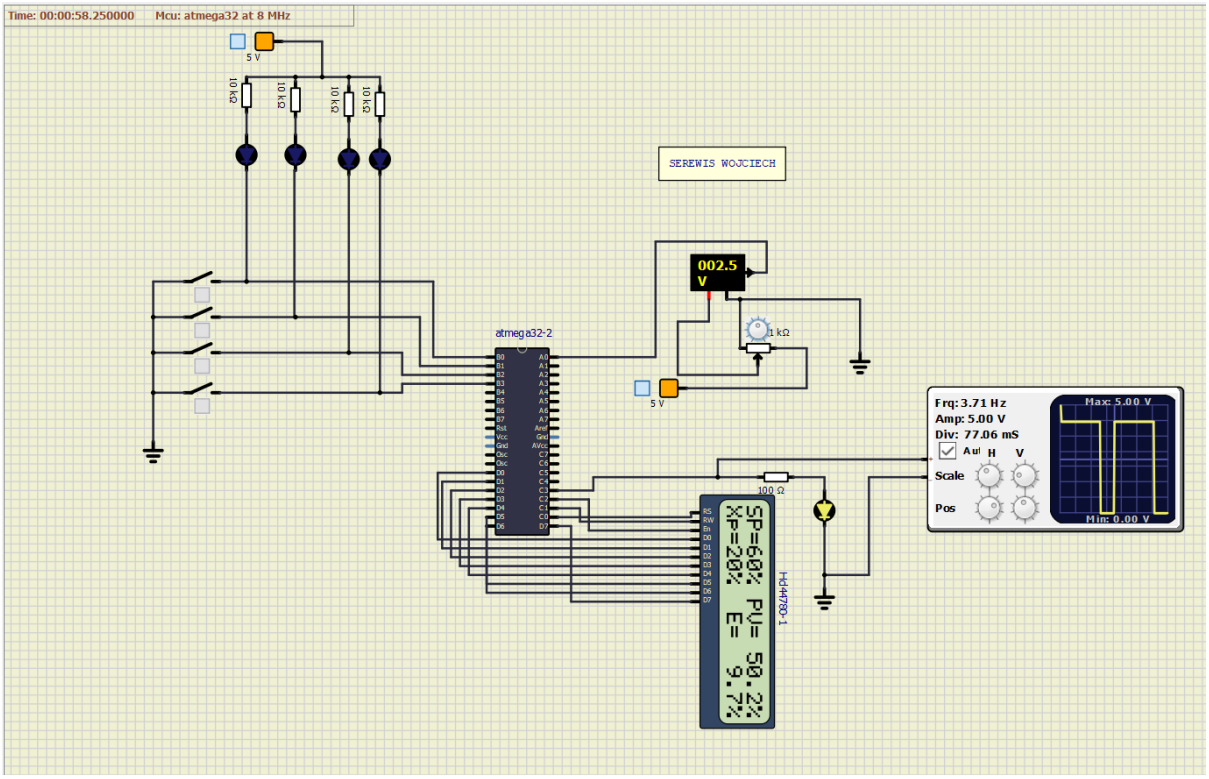


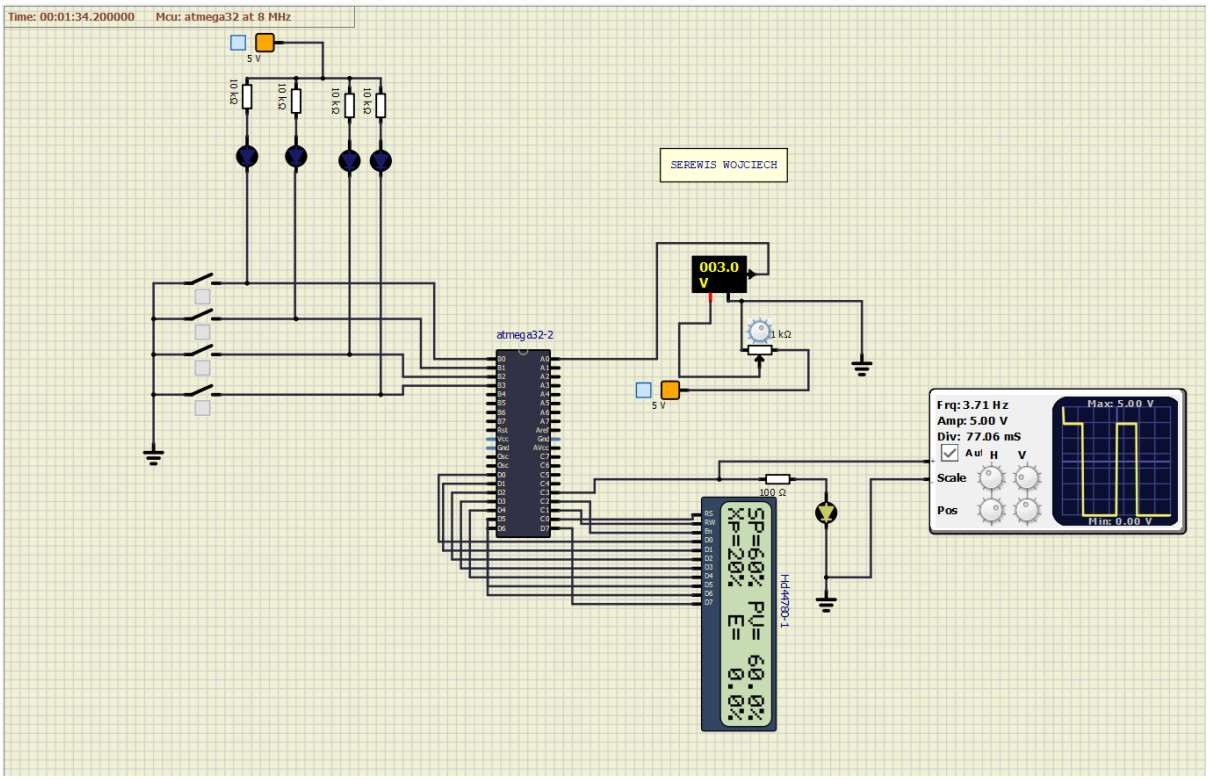
Projekt wyświetlacza LCD 16x2

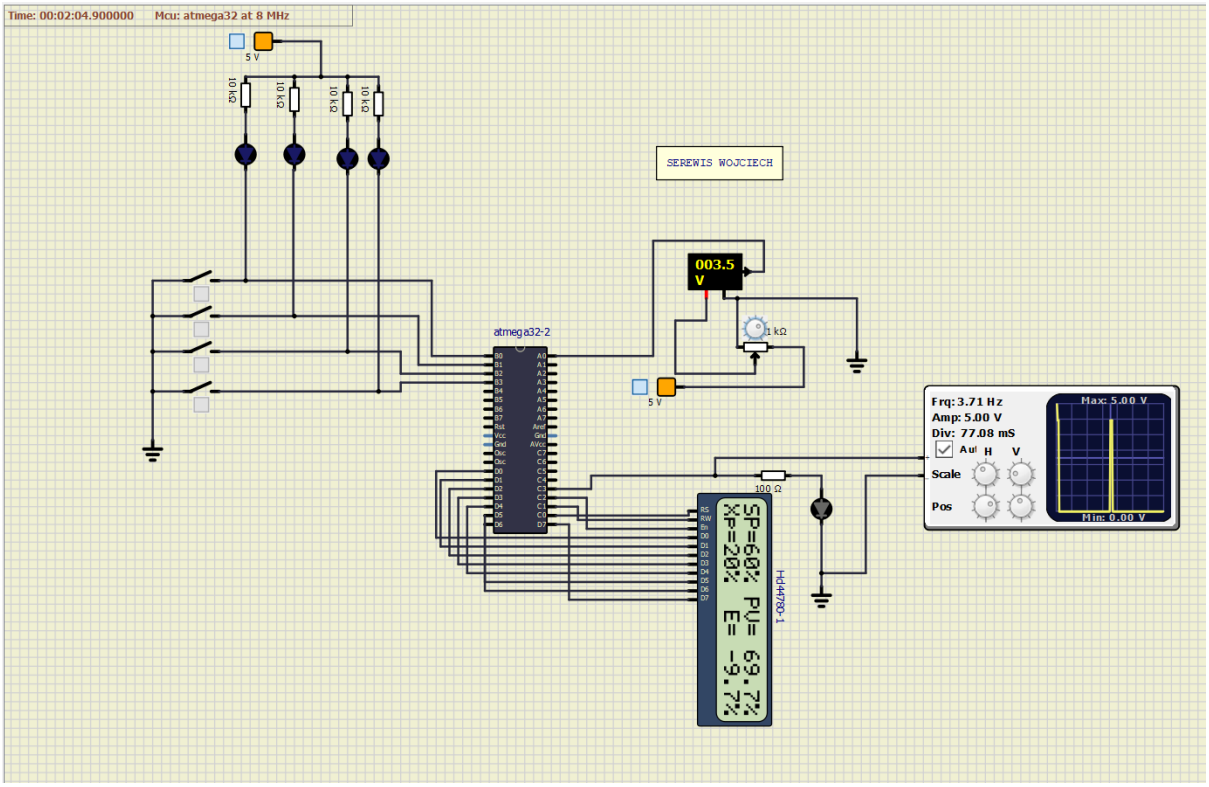
S	P	=	X	X	%		P	V	=		X	X	.	X	%
X	P	=	X	X	%			E	=	+	X	X	.	X	%

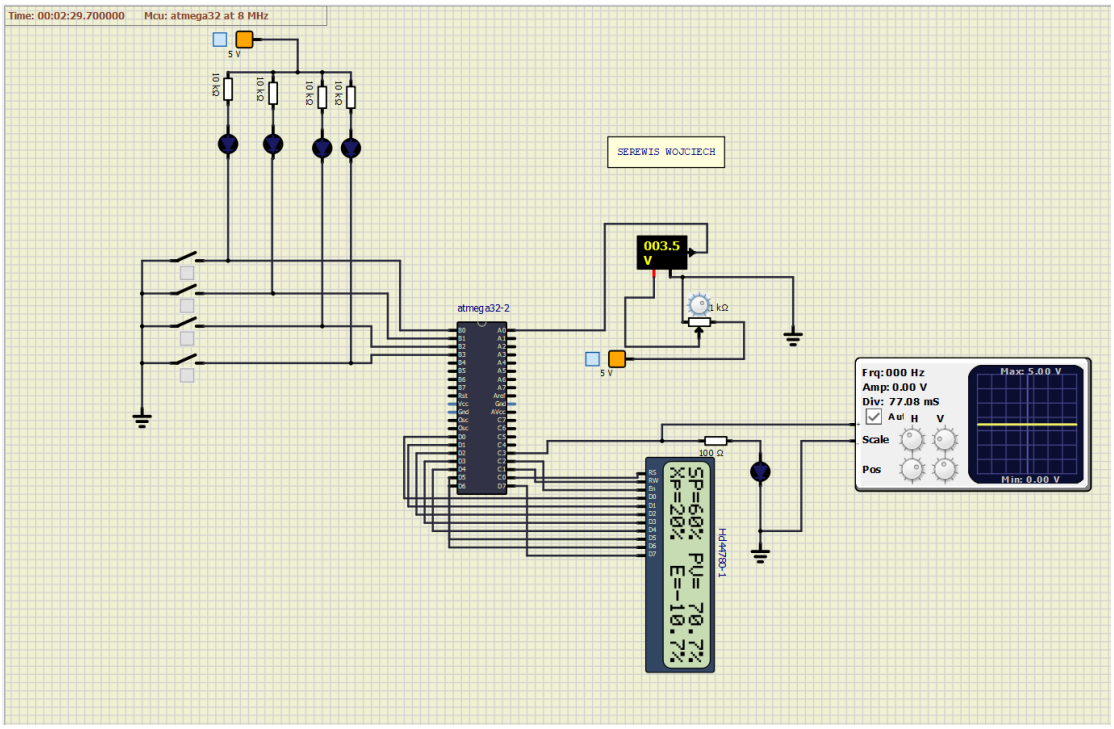
Badanie regulatora dla SP=60%, Xp=20%, okres sygnału T0 = 20[s], Autorzy: _____ _____ zakres pomiarowy: (0-400)°C / (0-5)V								
E[Xp]	E[%]	PV[%]	PV[ADC]	PV[°C]	PV[V]	CV[%]	tH[s] pomiar	tH[s]/20[s] x 100%
-1,00	-20,00%	80,00%	818,40	320,0	4,00	0	0	0%
-0,55	-11,00%	71,00%	726,33	284,0	3,55	0	0	0%
-0,50	-10,00%	70,00%	716,10	280,0	3,50	0	0	0%
-0,45	-9,00%	69,00%	705,87	276,0	3,45	5	2.01	10.05%
-0,40	-8,00%	68,00%	695,64	272,0	3,40	10	2.97	14.85%
-0,20	-4,00%	64,00%	654,72	256,0	3,20	30	7.03	35,15%
-0,10	-2,00%	62,00%	634,26	248,0	3,10	40	9.04	45.2%
0,00	0,00%	60,00%	613,80	240,0	3,00	50	10.68	53,4%
0,10	2,00%	58,00%	593,34	232,0	2,90	60	13.03	66.5%
0,20	4,00%	56,00%	572,88	224,0	2,80	70	15.15	75.75%
0,40	8,00%	52,00%	531,96	208,0	2,60	90	19.10	95.5%
0,45	9,00%	51,00%	521,73	204,0	2,55	95	19.97	99.85%
0,50	10,00%	50,00%	511,50	200,0	2,50	100	20	100%
0,55	11,00%	49,00%	501,27	196,0	2,45	100	20	100%
1,00	20,00%	40,00%	409,20	160,0	2,00	100	20	100%




Time: 00:00:58.250000
Mcu: atmega32 at 8 MHz
5 V
10 kΩ
10 kΩ
10 kΩ
10 kΩ
SEREWIS WOJCIECH
002.5 V
1 kΩ
atmega32-2
5 V
100 Ω
SP=60%
XP=20%
PV= 50.2%
E= 9.7%
HD44780-1
Frq: 3.71 Hz
Amp: 5.00 V
Div: 77.06 mS
Auto
H
V
Scale
Pos
Max: 5.00 V
Min: 0.00 V


Time: 00:01:34.200000
Mcu: atmega32 at 8 MHz
5 V
10 kΩ
10 kΩ
10 kΩ
10 kΩ
SEREWIS WOJCIECH
003.0 V
1 kΩ
atmega32-2
5 V
100 Ω
SP=60%
XP=20%
PV= 60.0%
E= 0.0%
HD44780-1
Frq: 3.71 Hz
Amp: 5.00 V
Div: 77.06 mS
Auto
H
V
Scale
Pos
Max: 5.00 V
Min: 0.00 V


Time: 00:02:04.900000
Mcu: atmega32 at 8 MHz
5 V
10 kΩ
10 kΩ
10 kΩ
10 kΩ
SEREWIS WOJCIECH
003.5 V
1 kΩ
5 V
atmega32-2
100 Ω
SP=60%
PV= 69.7%
XP=20%
E= -9.7%
HH4780-1
Frq: 3.71 Hz
Amp: 5.00 V
Div: 77.08 mS
Aut
H
V
Scale
Pos
Max: 5.00 V
Min: 0.00 V


Time: 00:02:29.700000
Mcu: atmega32 at 8 MHz
5 V
10 kΩ
10 kΩ
10 kΩ
10 kΩ
SEREWIS WOJCIECH
003.5 V
1 kΩ
atmega32-2
5 V
100 Ω
Frq: 000 Hz
Amp: 0.00 V
Div: 77.08 mS
Auto
H
V
Scale
Pos
Max: 5.00 V
Min: 0.00 V
SP=60%
PV= 70.7%
XP=20%
E=-10.7%
LM044L

```
//Wojciech Serewis


int T0= 20; // [s]

while(1)
    {
        ADMUX = 0x40;
        ADCSRA = 0xe0;
        pv = ADC;
        pvp=(pv/1023)*100;
        ipv = (int)pvp;
        e = sp - pvp;
        dpv = (pvp-ipv)*10;
        de = (e - (int)e)*10;

        if(de<0)de=(-1);    //zabezpieczenie przed wyświetlaniem wartości ujemnej czesci dziesietnej

        if(e< -Xp/2)    cv=0;
        else if(e> Xp/2)    cv=100;
        else
        {   int i=0;
            cv=((2*e+Xp)/(2*Xp))*100;// Stosunek proporcji e do Xp
        }
        for(int j=0; j<=100;j+=5)
        {
            if(cv==0)
            {
            PORTC=~(0x01<<3);
            break;
            }
            if(j<=cv)PORTC=(0x01<<3);
            else PORTC=~(0x01<<3);
            _delay_ms(T0*50);
        }
        //przyciski
        if(!(PINB &(8<<PB0)))sp=50;
        if(!(PINB &(4<<PB0)))sp=40;
        if(!(PINB &(2<<PB0)))Xp=30;
        if(!(PINB &(1<<PB0)))Xp=40;

        LCD2x16_pos(1,1);
        sprintf(tmp,"SP=%2d%% PV=%3d.%1d%%  ",(int)sp, ipv,dpv);
        for(i=0;i < 16;i++)
            LCD2x16_putchar(tmp[i]);

        LCD2x16_pos(2,1);
        sprintf(tmp,"Xp=%2d%%  E=%3d.%1d%%   ",Xp, (int)e, de);
        for(i=0;i < 16;i++)
            LCD2x16_putchar(tmp[i]);
        delay_ms(50);
    }
```