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% Measurement exercise calculations for SMPC course

% Voltage measurement
disp('Voltage measurement')
V.Vdc = 350;
V.R1 = 40e3;
V.KN = 2500/1000;
V.VM = 3.3;

disp('1.a')
V.Ip = V.Vdc/V.R1;
V.Is = V.Ip*V.KN;
V.RM = V.VM/V.Is;
disp ('RM ='), disp(V.RM);


disp ('1.b')
disp('10-bit')
V.Vres10 = V.Vdc/(2^10);
disp ('Vres10 ='), disp(V.Vres10);
disp('12-bit')
V.Vres12 = V.Vdc/(2^12);
disp ('Vres12 ='), disp(V.Vres12);


disp('1.c')
V.V_act = 200;
V.VM_act = (2^12-1)*V.V_act/V.Vdc;
disp ('VM numeric ='), disp(V.VM_act);

% Current measurement
disp('Current measurement')
I.Ip = 100;
I.KN = 1/2000;
I.VM = 3.3;

disp('2.a')
I.Is = I.Ip*I.KN;
I.RM = I.VM/I.Is;
disp ('RM ='), disp(I.RM);


disp ('2.b')
disp('10-bit')
I.Ires10 = I.Ip/(2^10);
disp ('Ires10 ='), disp(I.Ires10);
disp('12-bit')
I.Ires12 = I.Ip/(2^12);
disp ('Ires12 ='), disp(I.Ires12);

disp('2.c')
I.Idc_act = 25;
I.IM = (2^12-1)*I.Idc_act/I.Ip;
disp ('IM numeric ='), disp(I.IM);

% V
% I
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Voltage measurement
1.a
RM =
  150.8571

1.b
10-bit
Vres10 =
    0.3418

12-bit
Vres12 =
    0.0854

1.c
VM numeric =
        2340

Current measurement
2.a
RM =
   66.0000

2.b
10-bit
Ires10 =
    0.0977

12-bit
Ires12 =
    0.0244

2.c
IM numeric =
   1.0238e+03
```

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