Computer Science & Engineering 341

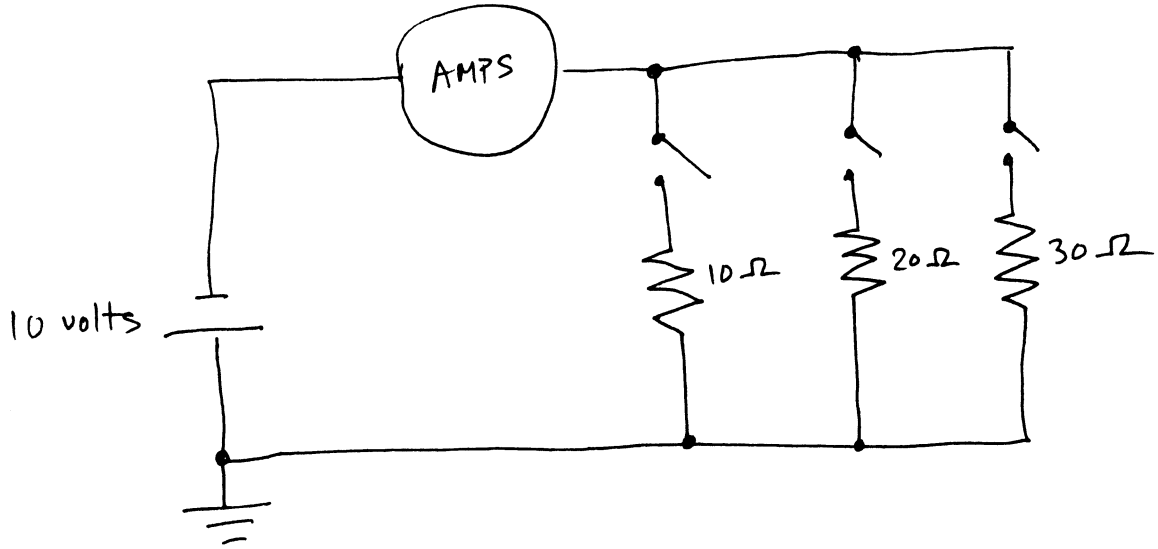
Assignment 9: Second CLP(R) Assignment

Due: June 3, 1998

Turn in a listing of your new rules, and sample output showing them working correctly. You may work alone or in pairs on this assignment. Actually the assignment is easy (well, maybe except for the extra credit part), but requires a small amount of electrical engineering knowledge. So if you are not an EE type try to pick an appropriate partner.

1. The CLP($\mathcal{R}$) code in `~borning/clpr/myprogs/resistors` on orcas/sanjuan solves some resistor/battery/meter circuit problems. Copy the file to your directory so that you can edit it. Add rules that define a switch: `switch(Lead1,Lead2,State)`. If `State=open`, then there should be no current through the switch. If `State=closed`, then the currents in the leads should be equal and opposite, and the voltages at `Lead1` and `Lead2` should be the same.

Write a rule that defines the following circuit. The states of the three switches should be parameters. First, use it to find the ammeter reading when all the switches are closed. Second, use it to find all possible switch settings such that the current is less than or equal to 1 ampere.



Your rule could thus be something like the following:

```
three_resistors(Amps,Switch1,Switch2,Switch3) :- .....
```

To find the answer to the first part of the question, use this goal:

```
?- three_resistors(Amps,closed,closed,closed).
```

To find the answer for the second part, use this. (Backtrack to get all possible answers.)

```
?- three_resistors(Amps,S1,S2,S3), Amps <=1.0.
```

2. **Extra credit**. Generlize your rule to make a circuit with n resistor/switch pairs, where n is a parameter of the rule. Thus if $n = 5$ you should get the following circuit. Demonstrate your rule working with $n = 20$ to find the current with all switches closed, and then find at least one setting for all the switches such that the current is between 0.1 and 0.5 amperes.