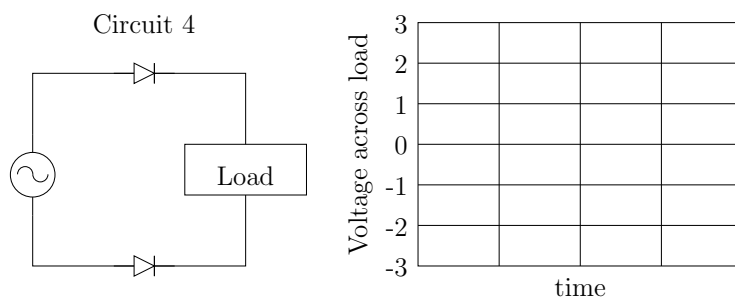
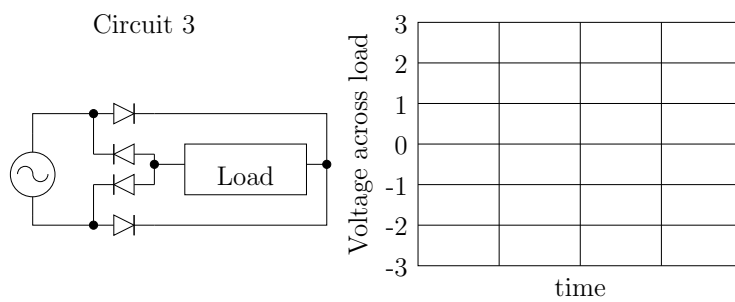
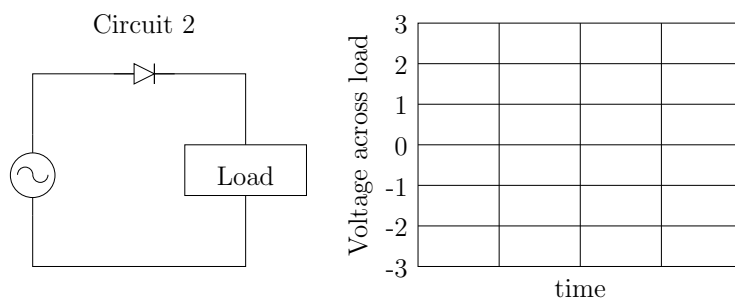
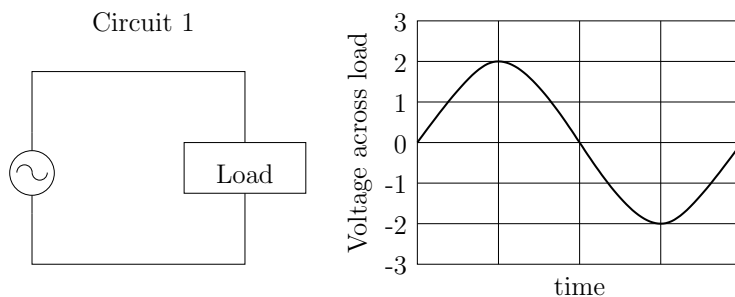


Physics 261  
Exam 2

Remember to show your work.  
40 points possible.

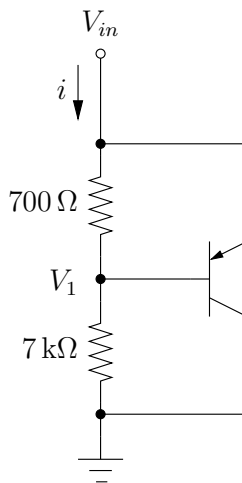
Name:

1. (6 points) In Circuit 1 and its accompanying graph, a time-dependent alternating voltage is applied to the load. Plot the voltage on the load in circuits 2, 3 and 4. Assume that the diode drop is 0.7 V.



2. (8 points) Design a circuit for which  $V_{out} = -\frac{1}{2}V_{in}$ .

3. In the circuit below, the turn-on (junction) voltage is  $V_T = 0.7\text{V}$ ;  $\beta = 100$ .



- (a) (3 points) Label the base **b**, emitter **e** and collector **c**.
- (b) (4 points) For what values of  $V_{in}$  is the transistor in cutoff mode?
- (c) (3 points) Assuming cutoff mode, what are  $i$  and  $V_1$  in terms of  $V_{in}$ ?
- (d) (8 points) Now assume the transistor is active. Find  $V_1, i_b, i_c, i$  in terms of  $V_{in}$ .

4. (8 points) Under what conditions is each lamp lit?

