Physics 4B Name: _____
Cascarano 6/2/06

Midterm Exam #2

1) Closed book and notes, except for the supplied formula sheet
2) You may use a scientific calculator
3) Please ask me if anything is unclear and let me know right away if you see a typo

Problem	Points Possible	Your Score
1	8	
2	8	
3	15	
4	18	
5	20	
6a	16	
6b	15	
Total	100	

Name: _____

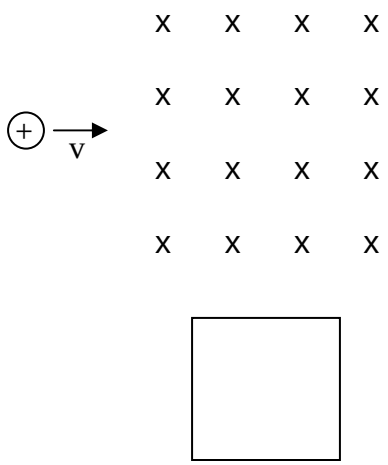
6/2/06

Problem 1 (8 points)

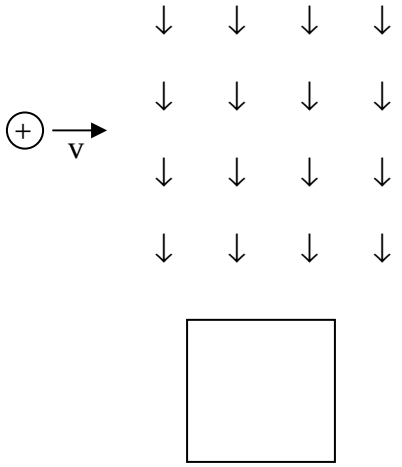
Determine the initial direction of deflection for the charged particles entering the magnetic fields shown. Write the number of the correct response in the box.

1) to the right
2) to the left
3) to the top of the page
4) to the bottom of the page
5) into the page
6) out of the page
7) there is no deflection

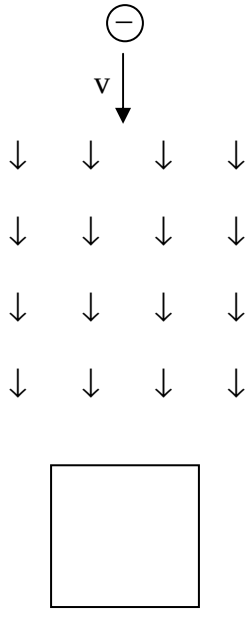
a)



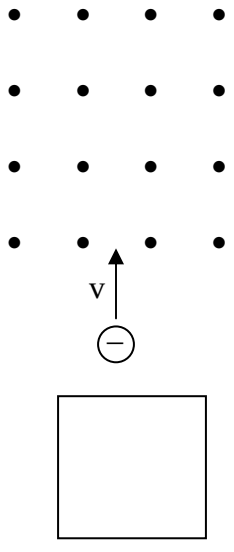
b)



c)



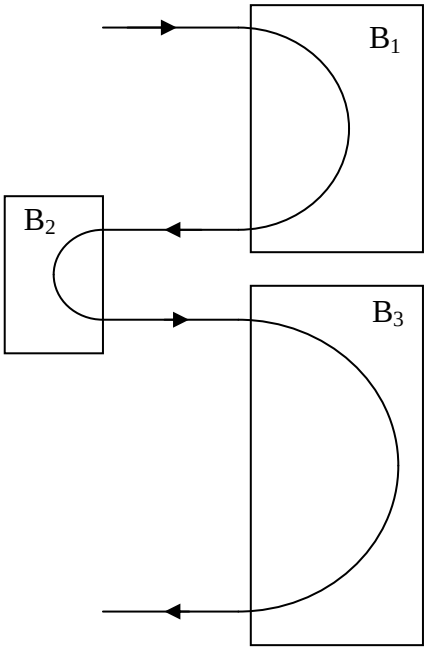
d)



Problem 2 (8 points)

An electron follows the path shown in the figure below as it moves through three regions with different uniform magnetic fields, B_1, B_2, B_3. In each region the electron completes a half circle.

a) Use arrows, dots, and/or crosses to indicate the direction of the magnetic field in each region.



b) Rank the magnitude of the magnetic fields in increasing order. Indicate ties where appropriate.

_____ _____ _____

smallest greatest

Problem 3 (15 points)

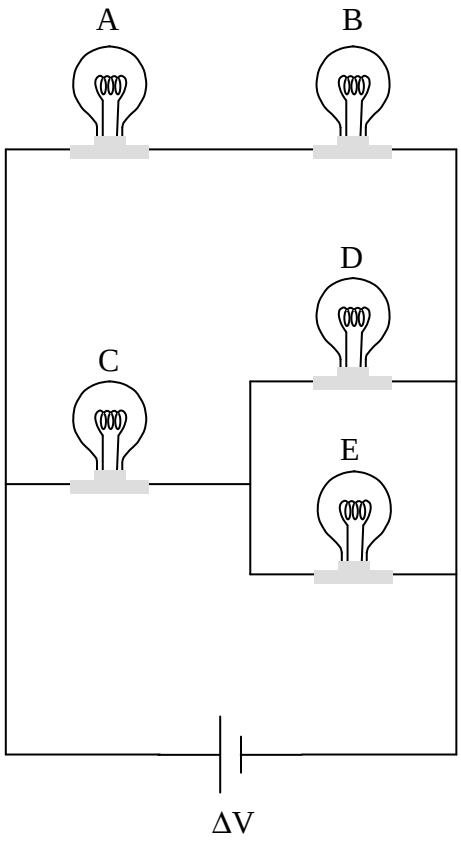
Four light bulbs (A, B, C, and D) are connected together in a circuit of unknown arrangement. When each bulb is removed one at a time and replaced, the following behavior is observed:

	A	B	C	D
A removed	---	On	On	On
B removed	On	---	On	Off
C removed	Off	Off	---	Off
D removed	On	Off	On	---

Draw a circuit diagram for these bulbs.

Problem 4 (18 points)

The intensity of a light bulb is proportional to the power it uses. The light bulbs are all rated at 120 V and have the following power ratings:
bulb A is 100 W
bulb B is 60 W
bulb C is 75 W
bulb D is 150 W
bulb E is 150 W



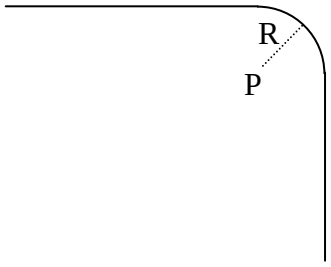
Rank in order of increasing brightness. Indicate ties where appropriate. Show your reasoning.

_____ _____ _____ _____ _____

Least bright Most bright

Problem 5 (20 points)

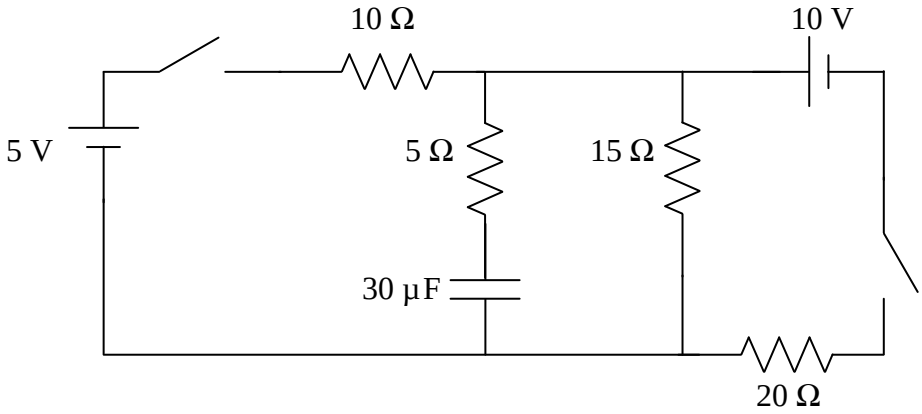
A wire is bent into the shape below, which consists of two straight sections and one arc of a circle of radius R. The wire is in the plane of the page and carries a current I.
Find the magnetic field (magnitude and direction) at the center of the arc, point P.



Problem 6a (16 points)

In the following circuit, both switches are closed and have been for a long time.

a) What is the current (magnitude and direction) in the 10 Ω resistor?



Problem 6b (15 points)

In completing parts b and c of problem 6, please use this as your answer to part a (this way you can do parts b and c without getting part a):

I = 0.2 A to the left ← (the current in the 10 Ω resistor)

b) What is the charge stored on the capacitor?

c) If the switches are both opened at t = 0, how much time does it take for the capacitor to discharge to ½ its initial charge?