Physics 208 - Grading Sheet.

Dept. of Physics and Astronomy. TAMU.

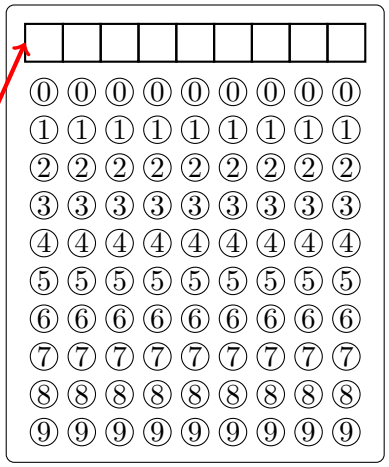
Marking Instructions

Fill oval completely ① ● ③ ④ ⑤

Erase cleanly ① ② ③ ④ ⑤

Students Fill Only this information

1. First Name: _____ Last Name: _____
2. Section: _____
3. Clearly hand-write your 9-digit UIN in the square boxes at the right.
4. Then fill out the bubbles below corresponding to the digits in the UIN.



Exam Information:

1. Fill whether this is exam 1, 2, 3 or the Final ① ② ③ Ⓕ

Graders Fill Only this information

List of Learning Objectives: mark only those objectives achieved.

1. ① ② ③ ④ ⑤	21. ① ② ③ ④ ⑤	41. ① ② ③ ④ ⑤	61. ① ② ③ ④ ⑤
2. ① ② ③ ④ ⑤	22. ① ② ③ ④ ⑤	42. ① ② ③ ④ ⑤	62. ① ② ③ ④ ⑤
3. ① ② ③ ④ ⑤	23. ① ② ③ ④ ⑤	43. ① ② ③ ④ ⑤	63. ① ② ③ ④ ⑤
4. ① ② ③ ④ ⑤	24. ① ② ③ ④ ⑤	44. ① ② ③ ④ ⑤	64. ① ② ③ ④ ⑤
5. ① ② ③ ④ ⑤	25. ① ② ③ ④ ⑤	45. ① ② ③ ④ ⑤	65. ① ② ③ ④ ⑤
6. ① ② ③ ④ ⑤	26. ① ② ③ ④ ⑤	46. ① ② ③ ④ ⑤	66. ① ② ③ ④ ⑤
7. ① ② ③ ④ ⑤	27. ① ② ③ ④ ⑤	47. ① ② ③ ④ ⑤	67. ① ② ③ ④ ⑤
8. ① ② ③ ④ ⑤	28. ① ② ③ ④ ⑤	48. ① ② ③ ④ ⑤	68. ① ② ③ ④ ⑤
9. ① ② ③ ④ ⑤	29. ① ② ③ ④ ⑤	49. ① ② ③ ④ ⑤	69. ① ② ③ ④ ⑤
10. ① ② ③ ④ ⑤	30. ① ② ③ ④ ⑤	50. ① ② ③ ④ ⑤	70. ① ② ③ ④ ⑤
11. ① ② ③ ④ ⑤	31. ① ② ③ ④ ⑤	51. ① ② ③ ④ ⑤	71. ① ② ③ ④ ⑤
12. ① ② ③ ④ ⑤	32. ① ② ③ ④ ⑤	52. ① ② ③ ④ ⑤	72. ① ② ③ ④ ⑤
13. ① ② ③ ④ ⑤	33. ① ② ③ ④ ⑤	53. ① ② ③ ④ ⑤	73. ① ② ③ ④ ⑤
14. ① ② ③ ④ ⑤	34. ① ② ③ ④ ⑤	54. ① ② ③ ④ ⑤	74. ① ② ③ ④ ⑤
15. ① ② ③ ④ ⑤	35. ① ② ③ ④ ⑤	55. ① ② ③ ④ ⑤	75. ① ② ③ ④ ⑤
16. ① ② ③ ④ ⑤	36. ① ② ③ ④ ⑤	56. ① ② ③ ④ ⑤	76. ① ② ③ ④ ⑤
17. ① ② ③ ④ ⑤	37. ① ② ③ ④ ⑤	57. ① ② ③ ④ ⑤	77. ① ② ③ ④ ⑤
18. ① ② ③ ④ ⑤	38. ① ② ③ ④ ⑤	58. ① ② ③ ④ ⑤	78. ① ② ③ ④ ⑤
19. ① ② ③ ④ ⑤	39. ① ② ③ ④ ⑤	59. ① ② ③ ④ ⑤	79. ① ② ③ ④ ⑤
20. ① ② ③ ④ ⑤	40. ① ② ③ ④ ⑤	60. ① ② ③ ④ ⑤	80. ① ② ③ ④ ⑤

Physics 208 – Exam I

Spring 2017 (all sections) **February 13th, 2017**

Please fill out the information and read the instructions below, but
do not open the exam until told to do so.

Rules of the exam:

1. You have 75 minutes (1.25 hrs) to complete the exam.
2. Formulae are provided to you with the exam on a separate sheet. Make sure you have one before the exam starts. You may *not* use any other formula sheet.
3. Check to see that there are 6 numbered (three double-sided) pages plus a blank page for additional work if needed, in addition to the scantron-like cover page. **Do not remove any pages**.
4. If you run out of space for a given problem, the last page has been left blank and may be used for extra space. Be sure to indicate *at the problem under consideration* that the extra space is being utilized so the graders know to look at it!
5. You will not be allowed to use calculators on this exam since all problems use symbols in their problem statements. Hence you **must** show your work clearly to receive full credit.
6. Cell phone use during the exam is strictly prohibited. Please turn off all ringers as calls during an exam can be quite distracting.
7. Be sure to put a box around your $\boxed{\text{final answer(s)}}$ and clearly indicate your work. Credit can be given **only** if your work is legible, clearly explained, and labelled.
8. All of the questions require you show your work and reasoning.
9. Have your TAMU ID ready when submitting your exam to the proctor.

Fill out the information below and sign to indicate
your understanding of the above rules

Name: _____ UIN: _____
(printed *legibly*)

Signature: _____ Section Number: _____

Instructor: Holt Mioduszewski Kocharovskya Rogagchev
(**circle one**)

Short Answers:

A) Consider an electric field given by $\vec{E}(x, y, z) = a\hat{i} + b\hat{j} + cz\hat{k}$, where a, b and c are constants. What is the magnitude of the electric flux through a square that is parallel to the xy plane and whose corners are located at the points (x,y,z)=(0,0,1),(1,0,1),(0,1,1),(1,1,1)

LO	S	U
1.1		
2.1		
5.1		
6.1		
16.1		

B) Two positively charged point particles $4Q$ and Q are placed at the points $x = 0$ and $x = d$, respectively. At what point along the line connecting the two charged particles is the net electric field zero?

LO	S	U
3.1		
5.2		
12.1		

C) An alpha particle (charge $+2e$) has an initial kinetic energy E very far from a stationary Xenon nucleus (charge $+54e$). If the alpha particle approaches the Xenon nucleus head-on, how close does it come before reversing its direction of motion? Assume that the Xenon nucleus remains stationary during the process.

LO	S	U
3.2		
5.3		
21.1		

D) A charged line segment of length L and uniform linear charge density λ is completely contained inside a sphere of radius R. What is the total electric flux through the surface of the sphere?

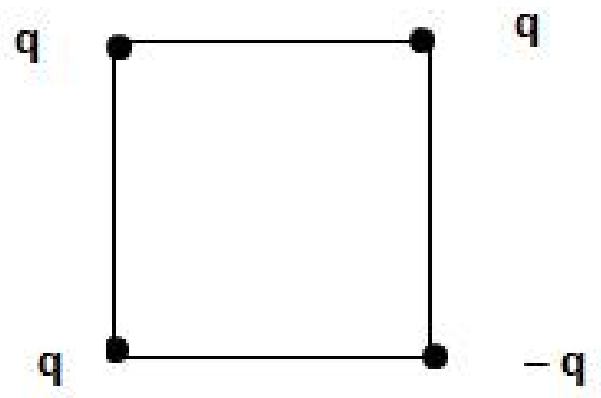
LO	S	U
5.4		
17.1		

Prob 1 Four point charges are located at the corners of a square of side L as shown in the figure.

(a) Draw a free-body force diagram for the $-q$ charge at the bottom right corner of the square. Be sure to indicate both the relative magnitude and direction of these forces.

(b) Find the magnitude of the total force on this $-q$ charge.

(c) If the $-q$ charge is moved to the center of the square, does the potential energy of the system increase, decrease or remain the same? Explain your choice.



LO	S	U
2.2		
3.3		
9.1		
21.2		

Prob 2 An infinite insulating hollow cylinder of radius r_1 and uniform charge per unit length, λ is oriented so that its long central axis is along the z-axis. A fixed point charge, $-Q$, is located at the position $(x, y, z) = (2r_1, 0, 0)$. Answer the following in terms of the constants given:

(a) What is the magnitude of the total electric field at the location $(x, y, z) = (3r_1, 0, 0)$?

(b) Assuming that the reference potential is set to be $V_{\text{ref}} = 0$ on the surface of the cylinder, what electric potential does the $-Q$ charge experience?

(c) How much work must be done by the electric field to bring the point charge from its location at $2r_1$ to the surface of the insulating cylinder at r_1?

LO	S	U
6.2		
11.1		
19.1		
21.3		
22.1		
24.1		

Prob 3 A total positive charge Q is distributed uniformly throughout a solid insulating sphere of radius R. A conducting spherical shell with net charge $-2Q$ has an inner radius $a > R$, outer radius b, and is concentric to the insulator.

(a) How much charge is located on the inner and outer surfaces of the **conductor**?

(b) What is the electric field in the regions $0 < r < R$, $R < r < a$ and $a < r < b$?

(c) What is the potential difference $\Delta V = V(b) - V(R)$?

LO	S	U
5.5		
6.3		
8.1		
19.2		
20.1		
24.2		

Extra Space: