1) (4 points) What are the metric units of the following quantities?

a) $ke^2 / r^2$ _____________________

b) $ke / r^2$ _____________________

c) $ke / r$ _____________________

d) $ke^2 / r$ _____________________

2) (6 points) Suppose two electrons are placed 1 nm apart in a vacuum. Then, one of them is released and speeds away to infinity. How fast will it be moving when it is very far (at infinity) from the other electron?
3) (10 points) Suppose three charges are placed at the corners of an equilateral triangle. The length of each side of the triangle is \( l = 6 \) \( \mu \)m. The two “bottom” charges are both +1 \( \mu \)C; the charge on the top tip of the triangle is –3 \( \mu \)C. Using (i, j) vector notation, what is the electrostatic force operating on the top charge? (Hint: Place the zero of your coordinate system at the half-way point of the base of the triangle.)
4) Suppose you have a cube with edges of length $a = 3 \text{ m}$ that is situated with its back-left-bottom corner on the origin of an $(x,y,z)$ coordinate system, as shown. Suppose also that there is an electric field in the vicinity which can be written as $\mathbf{E} = 2x \mathbf{i} + 4z \mathbf{k}$.

a) (4 points) Which surfaces of the cube have zero electric flux flowing through them? (Please designate the surfaces as top, bottom, left, right, front, back).

b) (6 points) What is the charge enclosed by the cube?
5) (10 points) A nonconducting disk has a uniform surface charge density of \( \sigma_0 = 1.2 \, \mu\text{C/m}^2 \). The radius of the disk is \( a = 3 \, \text{cm} \). The disk also has a hole cut in its exact center with a radius of \( b = 1 \, \text{cm} \). Find the electric potential at a point \( P \) which is located on the axis of the disk, and \( z = 5 \, \text{cm} \) from the center of the disk.