1. In a certain region of space, the electric potential is zero everywhere along the \( x \) axis. From this we can conclude that the \( x \) component of the electric field in this region is

- zero
- in the \( x \) direction
- in the \( -x \) direction.

2. In a certain region of space, the electric field is zero. From this we can conclude that the electric potential in this region is

- zero
- constant
- positive
- negative.

3. An electron initially at rest is accelerated through a potential difference of 1 V, and gains kinetic energy \( KE_e \). A proton, also initially at rest, is accelerated through a potential difference of \(-1\) V, and gains kinetic energy \( KE_p \). Which of the following must be true?

- \( KE_e < KE_p \)
- \( KE_e = KE_p \)
- \( KE_e > KE_p \)
- not enough information

4. Consider a collection of charges in a given region, and suppose all other charges are distant and have negligible effect. The electric potential is taken to be zero at infinity. If the electric potential at a given point in the region is zero, which of the following statements must be true? (Only one is \textit{always} true.)

- The electric field is zero at that point.
- The electric potential energy is a minimum at that point.
- There is no net charge in the region.
- Some charges in the region are positive and some are negative.
- The charges have the same sign and are symmetrically arranged around the given point.

5. A spherical balloon contains a positively charged object at its center. As the balloon is inflated to a greater volume while the charged object remains at the center, does the electric potential at the surface of the balloon:

- increase
- decrease
- remain the same