1. Show that the relativistic motion of a particle in an attractive inverse square law of force is a precessing ellipse. Compute the precession of the perihelion of Mercury resulting from this effect. [Answer: 7″ per century. This is much smaller than the actual precession of 40″ per century. The latter value is obtained by using general relativity.]

2. A generalized potential suitable for use in a covariant Lagrangian for a single particle is

\[ U = -A_{\lambda\nu}(x_\mu)u^\lambda u^\nu , \]

where \( A_{\lambda\nu} \) stands for a symmetric world tensor of the second rank and \( u^\nu \) are the components of the world velocity. If the Lagrangian is

\[ \mathcal{L} = \frac{1}{2} m u_\nu u^\nu - U \]

obtain the Euler - Lagrange equations of motion. What is the Minkowski force? Give the components of the force as observed in some Lorentz frame.