TFY4345 Classical Mechanics. Department of Physics, NTNU.

FORMULAS FOR EXAM 27.11.2023

The meaning of the symbols is assumed to be known.

$$L = T - V$$

$$\frac{d}{dt}\frac{\partial L}{\partial \dot{q}} = \frac{\partial L}{\partial q}$$

$$H = \sum_i p_i \dot{q}_i - L$$

$$p = \frac{\partial L}{\partial \dot{q}}$$

$$\dot{q} = \frac{\partial H}{\partial p} \quad , \quad \dot{p} = -\frac{\partial H}{\partial q}$$

$$r = \frac{p}{1 + \varepsilon \cos\theta}$$

$$\boldsymbol{A}_{\rm rot} = \begin{pmatrix} \cos\phi & \sin\phi \\ -\sin\phi & \cos\phi \end{pmatrix}$$

$$x' = x \ , \ y' = y \ , \ z' = \gamma(z - vt) \ , \ t' = \gamma(t - vz/c^2) \ , \ \gamma = (1 - v^2/c^2)^{-1/2}$$

$$\boldsymbol{L} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \gamma & i\beta\gamma \\ 0 & 0 & -i\beta\gamma & \gamma \end{pmatrix} \quad , \quad \beta = v/c$$

$$v_{31} = \frac{v_{32} + v_{21}}{1 + v_{32}v_{21}/c^2}$$

$$E^2 = (pc)^2 + (mc^2)^2$$

$$\boldsymbol{B} = \nabla \times \boldsymbol{A} \quad , \quad \boldsymbol{E} = -\nabla\phi - \frac{\partial \boldsymbol{A}}{\partial t}$$

$$F = F_1(q, Q) \ , \ p = \frac{\partial F_1}{\partial q} \ , \ P = -\frac{\partial F_1}{\partial Q} \ , \ K = H$$

$$[u, v] = \frac{\partial u}{\partial q}\frac{\partial v}{\partial p} - \frac{\partial u}{\partial p}\frac{\partial v}{\partial q}$$