$$[\gamma^a, \gamma^b]\partial_a \partial_b = 0$$

$a = 1 \quad b = 2$

$a = 2 \quad b = 1$

$$(\gamma^1\gamma^2 - \gamma^2\gamma^1)\partial_1 \partial_2 + (\gamma^2\gamma^1 - \gamma^1\gamma^2)\partial_2 \partial_1 = 0$$

$$\sum_{ab=}^{3} [\gamma^a, \gamma^b]\partial_a \partial_b = 0$$

$\gamma^a \quad 4 \times 4$

$$\{\gamma^a, \gamma^b\} = \gamma^a\gamma^b + \gamma^b\gamma^a$$

^{ab} $(-1 \ 0 \ 0 \ 0)$

$$= 2\eta^{ab} = 2\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$\eta' = -\eta .$$

$$\{\gamma^i, \gamma^k\} = 2 g^{ik}$$

$$i, k = 0\ 1\ 2\ 3$$

$$\gamma^i = c^i{}_a \gamma^a$$

$$\{\gamma^i, \gamma^k\} = c^i{}_a c^k{}_b \{\gamma^a, \gamma^b\}$$

$$= 2 c^i{}_a c^k{}_b \eta^{ab}$$

$$= 2 g^{ik}$$

$$g_{ik} = c_i{}^a \eta_{ab} c^b{}_k$$

$$ds^2 = g_{ik}\, dx^i\, dx^k$$

$$\int_a^b \rho f u_k\, dx = \int_a^b \rho \left(\sum c_j u_j\right) u_k\, dx$$

$$= c_j \delta_{jk} = c_k$$

$$f(x) = \sum_{k=1}^{\infty} a_k \underbrace{u_k(x)}_{} \quad \text{e.fcns.}$$

$$a_k = \int_a^b dx\, \rho(x) u_k(x)\, f(x)$$

$$f(x) = \sum_{k=1}^{\infty} u_k(x) \int_a^b dy\, \rho(y)\, u_k(y)\, f(y)$$

$$= \int_a^b dy\, f(y) \left[\sum_{k=1}^{\infty} \rho(y)\, u_k(x)\, u_k(y) \right]$$

$$= \int_a^b dy\, f(y)\, \delta(x-y)$$

$$\infty$$

$$\delta(x-y) = \rho(y) \sum_{k=1} u_k(x) u_k(y)$$

$$= \rho(x) \sum_{k=1}^{\infty} u_k(x) u_k(y)$$

$$\delta(x) = \rho(x) \sum_{k=1}^{\infty} u_k(x) u_k(0)$$

$$\delta(x-y) = \rho(x) \sum_{k=1}^{\infty} u_k(x) u_k(y)$$

$$L\, G(x-y) = \delta(x-y)$$

$$G(x-y) = \sum_{k=1}^{\infty} c_k u_k(x) u_k(y)$$

$$L_x G(x-y) = \sum_k L_x u_k(x) u_k(y) c_k$$

$$= \sum_k \rho(x) \lambda_k u_k(x) u_k(y) c_k$$

$$= \rho(x) \sum_k u_k(x) u_k(y)$$

$$c_k = \frac{1}{}$$

$${}_k \qquad \lambda_k$$

$$\delta(x-y) = \rho(x) \sum_{k=1}^{\infty} u_k(x) u_k(y)$$

$$G(x,y) = \sum_{k=1}^{\infty} \frac{u_k(x) u_k(y)}{\lambda_k}$$

$$L f(x) = h(x)$$

$$f(x) = \int G(x,y) h(y) dy$$

$$L f(x) = \int \delta(x-y) h(y) dy$$
$$= h(x)$$

$$\partial_0 = \frac{\partial}{\partial x^0} = \frac{\partial}{\partial t}$$

$$\partial^0 = \frac{\partial}{\partial x_0} = -\frac{\partial}{\partial x^0} = -\frac{\partial}{\partial t}$$

$$\eta = (-1, 1, 1, 1)$$

$$\partial_1 = \frac{\partial}{\partial x^1} = \frac{\partial}{\partial x}$$

$$\partial^2 = \frac{\partial}{\partial x_2} = \frac{\partial}{\partial x^2} = \frac{\partial}{\partial y}$$

$$L = \frac{m}{2}\dot{q}^2 - V(q)$$

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

$$\frac{\partial L}{\partial x^a} = 0$$

$$ds^2 = g_{ik}\, dx^i\, dx^k$$

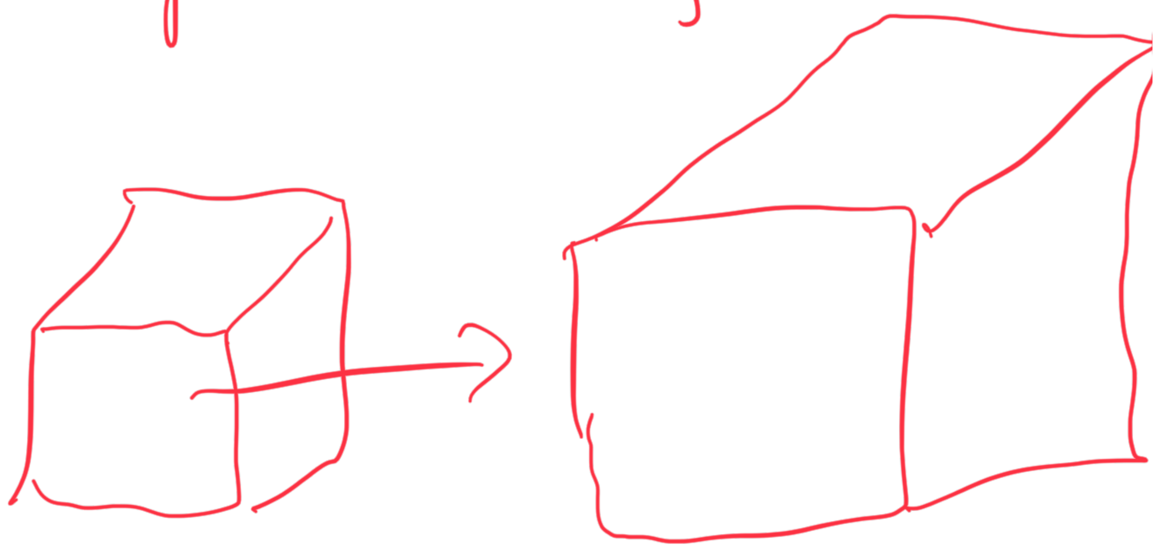
$$= dt^2 + g_i (dx^i)^2$$

$$= g_{00}\,dx^0 \; + \; g_{ik}\,dx^i \dots$$

$$x^0 = ct$$

$$x^i \rightarrow r, \theta, \varphi$$

$$g_{ik} \longleftarrow \rho$$



less energy

more energy

$$p = -\frac{\partial u}{\partial V} < 0$$

$$\frac{\partial u}{\partial V} > 0$$

$U \alpha V$