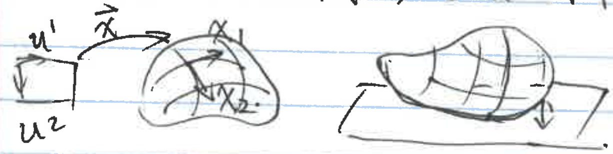
Take-Aways 0. comfortable with tensor calculus & Eistein notation

1. parameterize the surface/curve (ie. introducing coordinate $\vec{x}(t)$ $\vec{x}(u^1, u^2)$) could be beneficial. helps us to investigate local (sometimes global. like Gauss-Bonnet) properties on the surface, or mapping / corrsp between 2 surfaces.

2. coordinate are just coord, geometric properties are independent of them, such as k_n (normal curv), k_g (geodesic), length, angle, area.
Some ~~can be p~~ transform under fixed rules (tensor), such as $g_{\alpha\beta}$, $b_{\alpha\beta}$ ⇐ these are associated with introducing a param ~~coord~~ $u^1 u^2$.

3. 1st-FF, 2nd-FF.



$ds^2 = g_{\alpha\beta} du^\alpha du^\beta$ (how it stretches).

$g_{\alpha\beta} = x_\alpha \cdot x_\beta$.

$b_{\alpha\beta} du^\alpha du^\beta$ (how it deviate plane)

$$b_{\alpha\beta} = -x_\alpha \cdot n_\beta = x_{\alpha\beta} \cdot n = x_{\alpha\beta}\left(\frac{x_1 \times x_2}{\sqrt{g}}\right) = \frac{1}{\sqrt{g}}\left| x_1 \ x_2 \ x_{\alpha\beta} \right|$$

curve & surface.

4. ~~cureves~~ curves on surface ~~has~~ richer properties when embeded in surface, joint consideration of $\vec{n}$
surfaces are investigated through family of curves, often propertis are casted by any curve/special curve. [e.g. conformal mapping preserve angle ⇒ ∀2 curves on surface]].

5. Application of 1st-FF 2nd-FF: geodesic, mapping etc.

6. Some interesting theorem
 1) intrinsic coord on curve/surface, Frenet / and its inverse: give t.p.b. ⇒ curve?
 2) some properties ~~depe~~ (Gaussian curvature) depends only on 1st FF.
 3) Gauss-Bonnet.

7. Skip / Don't understand.

1) variational method, functional theory.

2) contra / co-vector conversion $g_{\alpha\beta}$. $g^{\alpha\beta}$

etc. ....