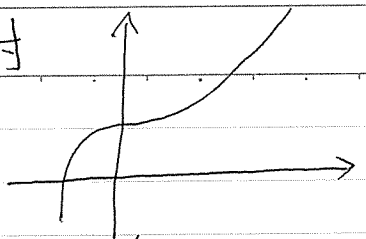
第1回 数理科学ⅢA

No. 4/11(火)
Date

西村



ⅢA 春　homotopy theory
ⅢB 秋　homotopy type theory

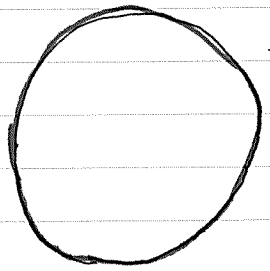
位相構造 (topological structure)

$f : \mathbb{R} \to \mathbb{R}$ 連続写像

$\lim a_n = a$
$\lim f(a_n) = f(a)$

近傍

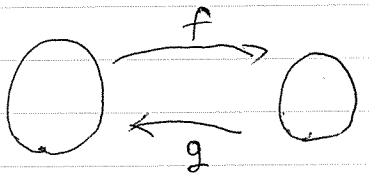
開集合 (open sets)
○ $\Rightarrow f^{-1}(○)$ 開
閉



$E^1 = \{ x \in \mathbb{R}^2 \mid |x^2| = 1 \}$

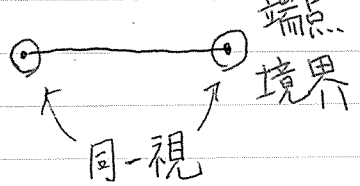
同一視 (identify)

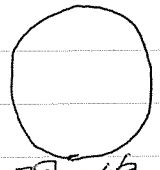
S^2



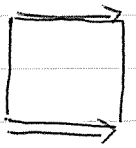
$f \circ g$　$g \circ f$
id

曲線　$I = [0,1]$





閉曲線

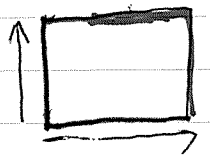


円筒

近代化

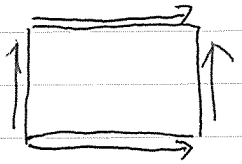
キリル文字

境界 (boundary)

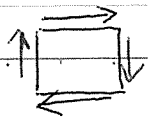


球面　閉曲面

Möbius の帯
メービウス



ドーナツ (donuts)
torus

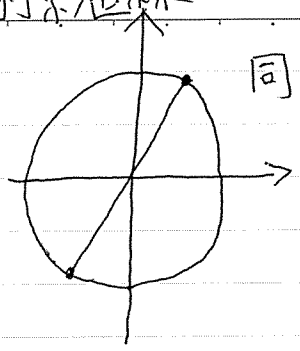


射影平面 (projective plane)

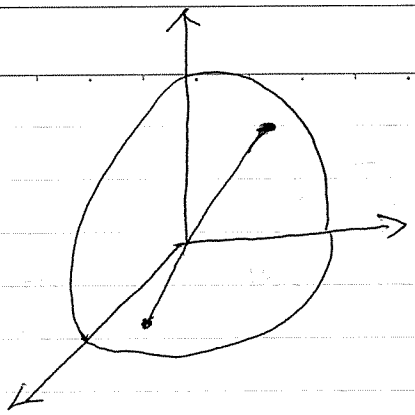
No.

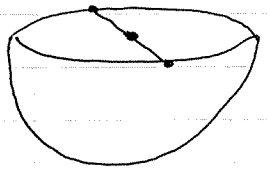
Date . .

射影直線

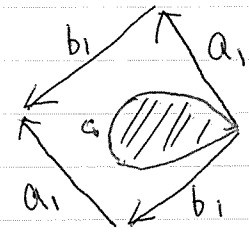


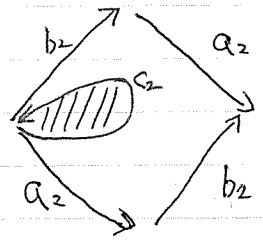
同一視

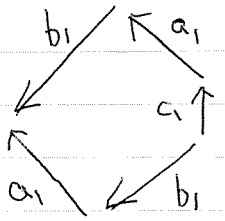


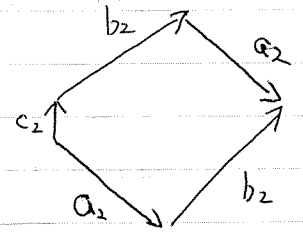


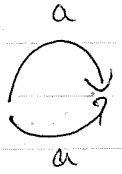
2つの torus をひっつけて ひとつにする.





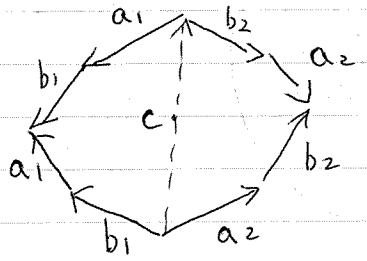






2-gon

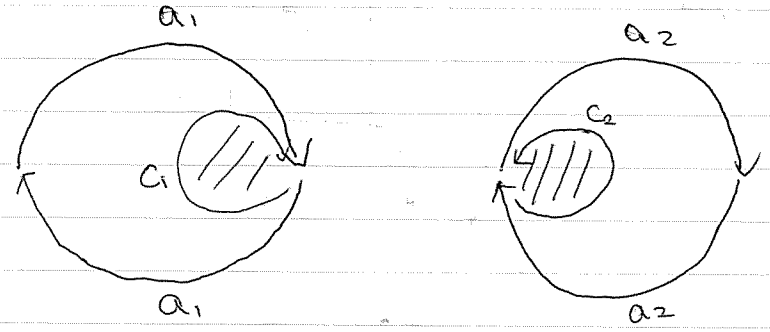
aa^{-1}

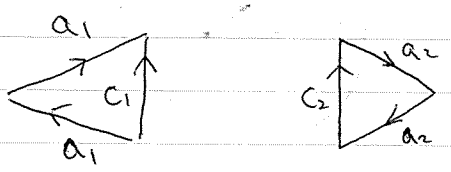


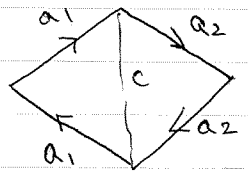
$a_1 b_1 a_1^{-1} b_1^{-1} a_2 b_2 a_2^{-1} b_2^{-1}$

No.

Date . .

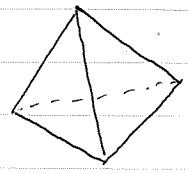






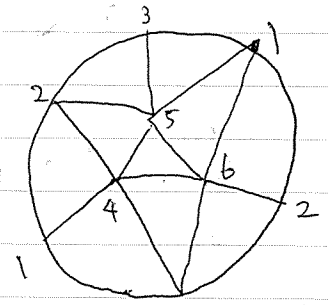
位相幾何学 (topology)

位相空間　　triangulation (三角形分割)



三角錐

射影平面



頂点6

辺15

三角形10

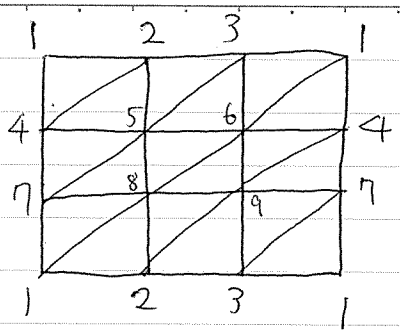
$\chi(M) = 6 - 15 + 10$

$= 1$

No.

Date . .

torus



頂点 9

三角形 18

辺

$\chi(M) = 9 - 27 + 18$

$= 0$

Euler chearacteristic

18c

vertex · edge

$\chi(M) = \underset{\text{頂点}}{V} - \underset{\text{辺}}{e} + \underset{\text{三角形}}{t}$

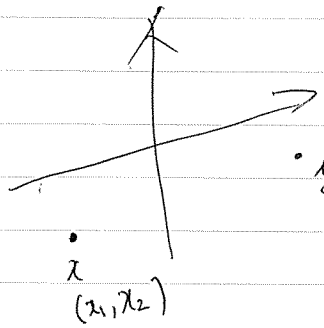
(例)

$4 - 6 + 4 = 2$

位相不変量

(topological invariant)

(宿題) 射影平面 torus の $\chi(M)$ を求めよ。



$\sqrt{(x_1-y_1)^2 + (x_2-y_2)^2}$ 長さ.