X
$\pi_1(X) =$
0
$H_1(X) =$
0
H_2
$_2(X, Z) Poincar\acute{e}duality H^2(X, Z) evaluation (H_2(X, Z), Z)$
$H_2(X, Z) \times$
$H_2(X, Z) \longrightarrow$
Z
A
B
X
0.5!
$T_X A +$
$T_X B =$
$T_X X$
$\in$
$A \cap$
B
$T_X A \oplus$
$T_X B =$
$T_X X$
$\{\epsilon_1, \ldots, \epsilon_n\} =$
$A \cap$
C
$A.$
$B =$
$\sum_{i=1}^{n} \epsilon_i$
$A.$
B
A
B
$[A], [B] \in H_2(X, Z).$

M
m
$H_m(M, Z)$
M
$[M] \in$
$H_m(M, Z)$
ω
$m.$
$$\int_M \omega = [\omega]([M]), [\omega] \in H^m_\Omega(M), [M] \in H_m(M).$$
0.8!
β
cross
3
times
the
disk
bounded
by
$\alpha.$
$T_X \alpha +$
$T_X \beta =$
$T_X \Sigma$
ü
$X =$
$S^2 \times$
S^2
$_2(S^2, Z) =$
Z
$H_1(S^2, Z) =$
0
$H_0(S^2, Z) =$
Z
$_2(\partial X) \to$
$H_2(X) \to$
$H_2(X, \partial X) \to$
$\to$
$H_1(\partial X) \to$
$H_1(X) \to$
$H_1(X, \partial X) \to$
$H_1(\partial X)$
$H_2(\partial X)$
0
$b_1(X) =$