

! see back of 3)

So, we know: $\Lambda = R * G \cong \text{End}({}_A R)$

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$\Rightarrow \text{CM}(\Lambda) \cong \text{proj-}(R * G)$

Claim: $\left[P \otimes_{R * G} R \cong P^G \right]$

$p \otimes r \xrightarrow{\alpha} \frac{1}{n} \sum_{\sigma} p[\sigma] \sigma^{-1}(r) = \frac{1}{n} \sum_{\sigma} p r [\sigma]$

$p \otimes 1 \xrightarrow{\beta} p$

we measure $\left[\begin{aligned} \alpha\beta(p) &= \frac{1}{n} \sum_{\sigma} p[\sigma] = p && \text{since } p[\sigma] = p \\ \beta\alpha(p \otimes r) &= \frac{1}{n} \sum_{\sigma} p[\sigma] \sigma^{-1}(r) \otimes 1 = \frac{1}{n} \sum_{\sigma} p r [\sigma] \otimes 1 = \\ &= \frac{1}{n} \sum_{\sigma} p \otimes r = p \otimes r \end{aligned} \right]$

$R * G / \mathfrak{m}(R * G) \cong kG$ [and all idempotents lift (complete!)]

$\Rightarrow \text{proj-}(R * G) \cong \text{proj-} kG = \text{mod-} kG$

$\left[\begin{array}{ccc} P & \longleftarrow & V \\ \text{s.t. } P/\mathfrak{m}P & \cong & V \end{array} \right]$

$P \longmapsto P/\mathfrak{m}P$
 $V \otimes_k R \longleftarrow V$

One can set $P = V \otimes_k R$

with the action: $\left[\begin{aligned} \sigma(v \otimes r) &= \sigma(v) \otimes \sigma(r) \\ a(v \otimes r) &= v \otimes ar \end{aligned} \right]$

(if $r \in k!$
 $= r \otimes a$)

$\mathfrak{m}P = V \otimes_k \mathfrak{m}$ $P/\mathfrak{m}P \cong V$

So, ind. proj. $= V_i \otimes_k R = P_i$ $P_0 = R$
where V_0, \dots, V_s $=$ irr. repr. of G

and ind. $\text{CM}(\Lambda) = (V_i \otimes_k R)^G = M_i$
 $M_0 = A$

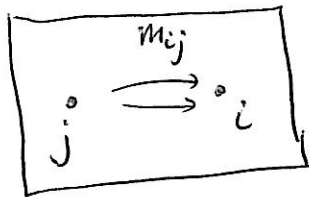
The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be clearly documented and verified. The second section covers the process of reconciling accounts, ensuring that all entries are balanced and consistent. This involves comparing the internal records with external statements and identifying any discrepancies. The final part of the document provides guidelines for the proper handling of financial data, including the use of appropriate accounting methods and the regular review of financial statements.

What is the sense of McKay quiver for A?

Let V be the fund. repr.

$\otimes = \otimes k$

$$V \otimes V_i = \sum_j V_j^{m_{ij}}$$



$\langle 2, 5 \rangle$

Koszul complex for $R[x, y]$:

$$0 \rightarrow \Lambda^2 V \otimes R \rightarrow V \otimes R \rightarrow R \rightarrow k \rightarrow 0$$

$$(x \wedge y) \otimes r \rightarrow \begin{matrix} x \otimes yr - \\ y \otimes xr \end{matrix}$$

$$V = \langle x, y \rangle$$

$$x \otimes y - y \otimes x$$

"determinant repr." $\sigma \mapsto \det \sigma$

$$\begin{cases} x \otimes r_1 + y \otimes r_2 \rightarrow xr_1 + yr_2 = 0 \\ \Rightarrow r_1 = y \otimes s \quad r_2 = x \otimes s \end{cases}$$
 ke mecau

$$V_i \otimes \Lambda^2 V = \tau V_i \quad (\text{irr.})$$

$$[V_i \otimes - \quad \tau P_i]$$

$$0 \rightarrow \tau V_i \otimes R \rightarrow V_i \otimes V \otimes R \rightarrow V_i \otimes R \rightarrow V_i \rightarrow 0$$

apply G :
$$0 \rightarrow (\tau P_i)^G \rightarrow (\oplus P_j^{m_{ij}})^G \rightarrow P_i^G \rightarrow V_i^G \rightarrow 0$$

$$\begin{matrix} \tau V_i \\ \tau P_i \\ \tau M_i \end{matrix}$$

$V_i \neq V_0$, get $V_i^G = 0$

$$0 \rightarrow (\tau P_i)^G \rightarrow (\oplus P_j^{m_{ij}})^G \rightarrow P_i^G \rightarrow 0$$

$$0 \rightarrow \tau M_i \rightarrow \underbrace{\oplus M_j^{m_{ij}}}_{E_i} \rightarrow M_i \rightarrow 0$$

Claim

$\varphi: M \rightarrow M_i$

is not a split epi \Rightarrow it factors through E_i

Proof:

$M = P^G$

φ comes from $P \xrightarrow{\psi} P_i$ ($R \# G$ -homom.)

$$\begin{matrix} V_i \otimes V \otimes R & \rightarrow & P_i & \rightarrow & V_i & \rightarrow & 0 \\ & & \uparrow \psi & & & & \\ & & P & & & & \end{matrix}$$
 $[V_i = P_i / m P_i]$

$\text{Im } \psi \subseteq m P_i$
 \Rightarrow factors through

$$V_i = V_0 \quad 0 \rightarrow \tau A \rightarrow (V \otimes R)^G \rightarrow A \rightarrow k \rightarrow 0$$

$$0 \rightarrow \tau P_0 \rightarrow V \otimes V \otimes R \rightarrow R \rightarrow k \rightarrow 0$$

$$0 \rightarrow \tau A \rightarrow (V \otimes R)^G \rightarrow (\oplus M_i^{m_{ij}})^G \rightarrow A \rightarrow k \rightarrow 0$$

same!



AR quiver :



(L 2,5) Aus

It describes all maps!

explain!

Theorem

$$\text{AR}(A) \simeq \text{MK}(G)$$

$$A \leftrightarrow k$$

Example

$$\begin{pmatrix} \varepsilon & 0 \\ 0 & \varepsilon^k \end{pmatrix}$$

$$\varepsilon = e^{\frac{2\pi i}{n+1}}$$

$$\text{gcd}(k, n+1) = 1$$

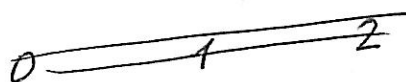
$$kG = \langle V_0, V_1, \dots, V_n \rangle$$

$$g \mapsto \varepsilon^i \quad (0 \leq i \leq n)$$

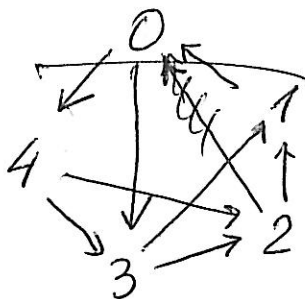
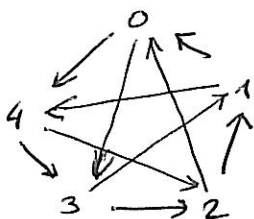
$$V_i \otimes V_0 = V_{i+1} \oplus V_{i+k}$$

(i+k modulo n+1)

- i
- 1, k
- 2, k+1



$n=4$ $k=2$



$$k = -1$$

$$i \rightleftharpoons i+1$$

!

$$\begin{pmatrix} \varepsilon & 0 \\ 0 & \varepsilon^k \end{pmatrix} \quad \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

$$\varepsilon^{2n} = 1$$

!

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$$\begin{pmatrix} \varepsilon & 0 \\ 0 & \varepsilon^k \end{pmatrix} \quad \begin{pmatrix} 0 & x \\ y & 0 \end{pmatrix} \quad xy = -1$$

$$\begin{pmatrix} 0 & \varepsilon x \\ \varepsilon^k y & 0 \end{pmatrix} \quad \begin{pmatrix} 0 & \varepsilon^{k+1} x \\ \varepsilon^{k+1} y & 0 \end{pmatrix}$$

$$\varepsilon^{k+1} = 1$$

① $1 \neq \sigma \in G \Rightarrow \exists a \in R \quad \sigma(a) \neq a \pmod{\mathfrak{p}}$

② $\bar{\mathfrak{p}} = A \cap \mathfrak{p} \quad R_{\mathfrak{p}} / \mathfrak{p} R_{\mathfrak{p}}$ is r -dim. over $A_{\bar{\mathfrak{p}}} / \bar{\mathfrak{p}} A_{\bar{\mathfrak{p}}}$
 \Rightarrow and G acts effectively on $R_{\mathfrak{p}} / \mathfrak{p} R_{\mathfrak{p}}$ ($r \leq n$)

$\Rightarrow r = n$ so $\mathfrak{p} R_{\mathfrak{p}} = \bar{\mathfrak{p}} A_{\mathfrak{p}}$
 and $R_{\mathfrak{p}} / \mathfrak{p} R_{\mathfrak{p}}$ is Galois ext. of $A_{\bar{\mathfrak{p}}} / \bar{\mathfrak{p}} A_{\bar{\mathfrak{p}}}$

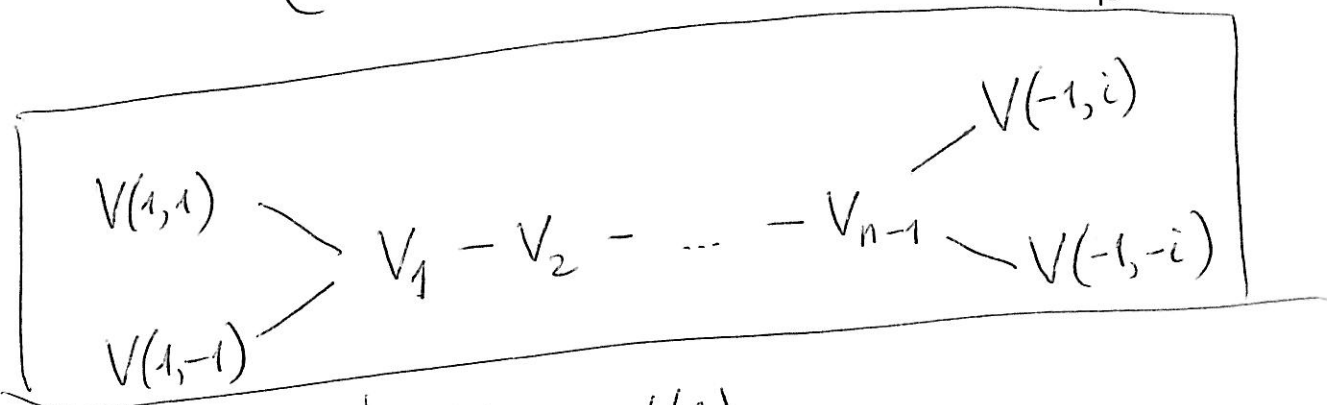
OK	!
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$L_{2,5}$ $a = \begin{pmatrix} \varepsilon^{\pi} & 0 \\ 0 & \varepsilon^{-1} \end{pmatrix}$ $b = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

$\varepsilon = e^{\frac{\pi k i}{n}}$ (-4)
 $V_{\neq 1} \quad V_{\neq i}$ (Aus)
 ~~$V_{\neq 1}$~~

1-dim: $a \mapsto \pm 1$ $b \mapsto \begin{cases} \pm 1 \\ \pm i \end{cases}$
 $V(1,1)$

2-dim: $a \mapsto \begin{pmatrix} \varepsilon^k & 0 \\ 0 & \varepsilon^{-k} \end{pmatrix}$ $b \mapsto \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ $k \text{ odd} < n$
 V_k $a \mapsto \begin{pmatrix} \varepsilon^k & 0 \\ 0 & \varepsilon^{-k} \end{pmatrix}$ $b \mapsto \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ $k \text{ even} < n$



	$\chi(a)$	$\chi(b)$
$V(1,1)$	1	1
$V(1,-1)$	1	-1
$V(-1,i)$	-1	i
$V(-1,-i)$	-1	-i
V_k	$2 \cos \frac{\pi k}{n}$	0
$V_k \otimes V_1$	$4 \cos \frac{\pi k}{n} \cos \frac{\pi}{n}$	0

$2 \cos \frac{\pi(k+1)}{n} + 2 \cos \frac{\pi(k-1)}{n}$

$k=1 \quad V(1,1) + V(1,-1)$
 $k=n-1 \rightarrow V(-1,i) + V(-1,-i)$

Dihedral

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