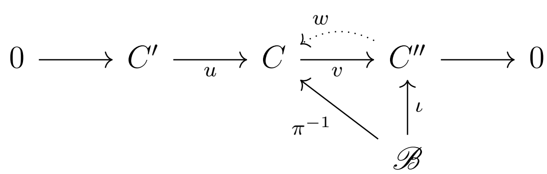
LOTS OF DIAGRAMS

DARYL DEFORD

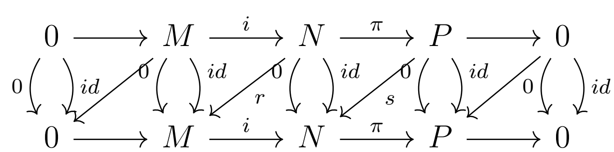
1. Commutative Diagrams

1.1.



1.2.

1.3.



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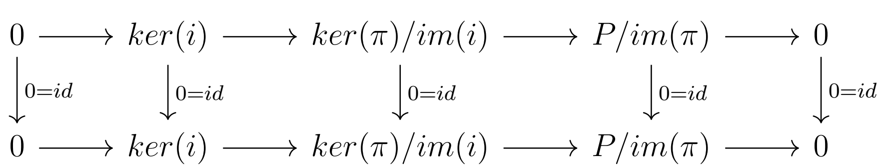

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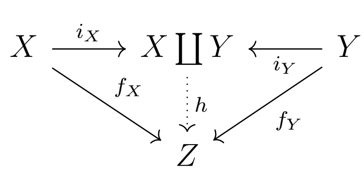
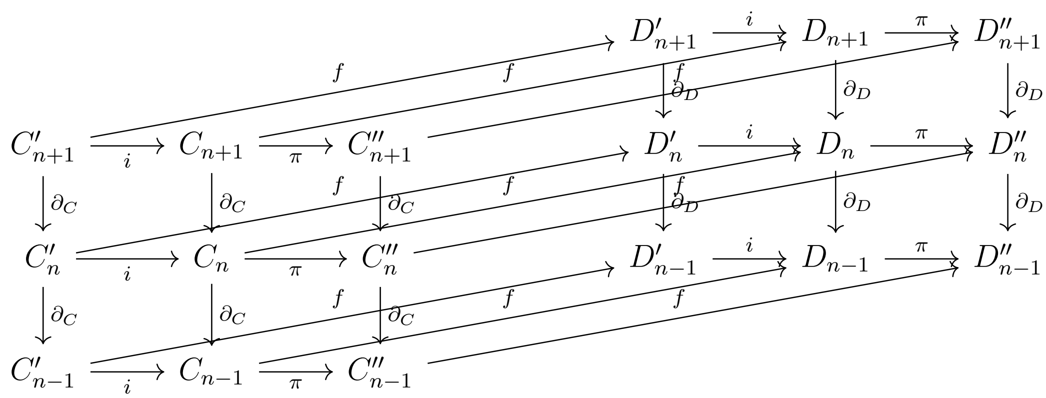
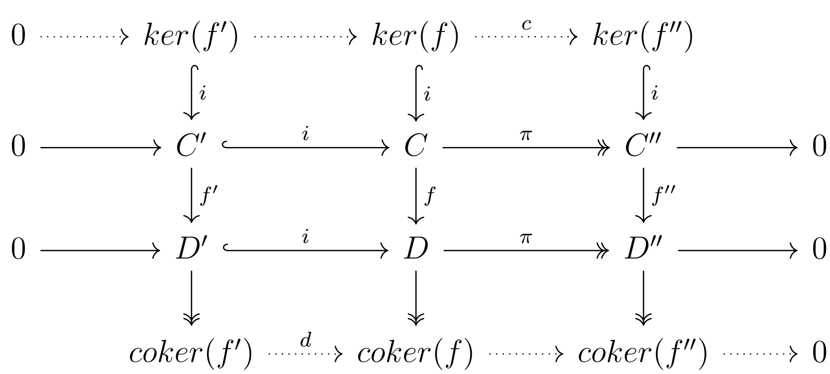


Date: October 27, 2016.

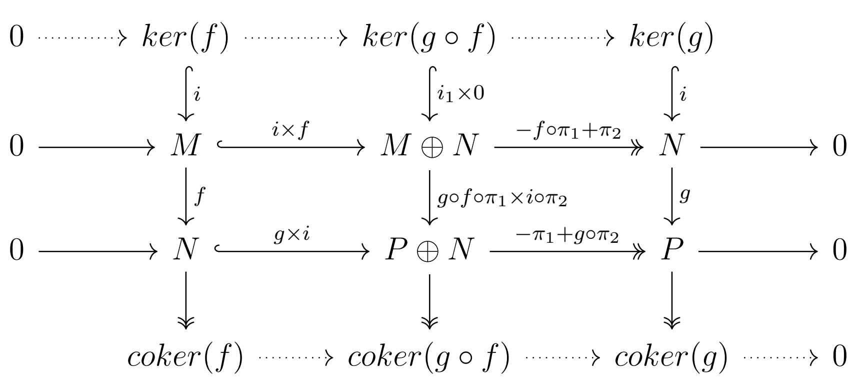
1.6.



1.7.



1.8.



1.9.

$$
\begin{array}{ccccccccc}
 & & \vdots\,\partial & & \vdots\,\partial & & \vdots\,\partial & & \\
0 & \longrightarrow & Z_{n+1} & \overset{i}{\hookrightarrow} & C_{n+1} & \overset{\partial}{\twoheadrightarrow} & B_n & \longrightarrow & 0 \\
 & & \downarrow \partial & & \downarrow \partial & & \downarrow \partial & & \\
0 & \longrightarrow & Z_n & \overset{i}{\hookrightarrow} & C_n & \overset{\partial}{\twoheadrightarrow} & B_{n-1} & \longrightarrow & 0 \\
 & & \downarrow \partial & & \downarrow \partial & & \downarrow \partial & & \\
0 & \longrightarrow & Z_{n-1} & \overset{i}{\hookrightarrow} & C_{n-1} & \overset{\partial}{\twoheadrightarrow} & B_{n-2} & \longrightarrow & 0 \\
 & & \vdots\,\partial & & \vdots\,\partial & & \vdots\,\partial & &
\end{array}
$$

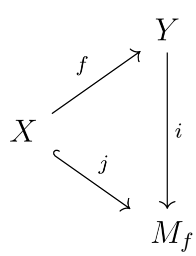
1.10.

$$\cdots \xrightarrow{i_*} H_n(C_*) \xrightarrow{\partial_*=0} H_n(B_*) \xrightarrow{\Delta} H_{n-1}(Z_*) \xrightarrow{i_*} H_{n-1}(C_*) \xrightarrow{\partial_*=0} \cdots$$

1.11.

$$\cdots \xrightarrow{i_*} H_n(C_*) \xrightarrow{\partial_*=0} 0 \longrightarrow H_n(B_*) \xhookrightarrow{\Delta} H_{n-1}(Z_*) \xrightarrow{i_*} H_{n-1}(C_*) \xrightarrow{\partial_*=0} 0$$

1.12.



1.13.

$$
\begin{array}{ccccc}
\tilde{H}_1(\mathbb{S}^1) & = & H_1(\mathbb{S}^1, D^1_+) & & \\
 & & \| & & \\
 & & H_1(D^1_-, \mathbb{S}^0) & = & \tilde{H}_0(\mathbb{S}^0)
\end{array}
$$

1.14.

$$\begin{array}{ccc} & y & \overset{}{\dashleftarrow} \; z \\ & \Big\downarrow{\scriptstyle \partial} & \\ i^{-1}(dy) \; \dashleftarrow & dy & \end{array}$$

1.15.

$$\begin{array}{ccc} \Sigma\mathbb{S}^n & \xrightarrow{\Sigma f} & \Sigma\mathbb{S}^n \\ \Big\downarrow{\scriptstyle \varphi} & & \Big\downarrow{\scriptstyle \varphi} \\ \mathbb{S}^{n+1} & \xrightarrow{\Sigma f'} & \mathbb{S}^{n+1} \end{array}$$

1.16.

$$\begin{array}{ccccccccccccc} & & 0 & & & & 0 & & 0 & & & & \\ & & \downarrow & & & & \downarrow & & \downarrow & & & & \\ \dashrightarrow & & \tilde{H}_1(X) & \xrightarrow{j_*} & H_1(X,A) & \xrightarrow{\overline{\partial}} & \tilde{H}_0(A) & \xrightarrow{i_*} & \tilde{H}_0(X) & \xrightarrow{j_*} & H_0(X,A) & \longrightarrow & 0 \\ & & \downarrow & & \| & & \downarrow & & \downarrow & & \| & & \\ \dashrightarrow & & H_1(X) & \xrightarrow{j_*} & H_1(X,A) & \xrightarrow{\partial} & H_0(A) & \xrightarrow{i_*} & H_0(X) & \xrightarrow{j_*} & H_0(X,A) & \longrightarrow & 0 \\ & & \downarrow & & & & \downarrow & & \downarrow & & & & \\ & & H_0(*) & & & & H_0(*) & = & H_0(*) & & & & \end{array}$$

1.17.

$$\begin{array}{cccccccccc} \dashrightarrow & H'_p & \xrightarrow{i} & H_p & \xrightarrow{\pi} & H''_p & \xrightarrow{\partial} & H'_{p-1} & \dashrightarrow \\ & \Big\downarrow{\scriptstyle f'} & & \Big\downarrow{\scriptstyle f} & & \Big\downarrow{\scriptstyle f''} & & \Big\downarrow{\scriptstyle f'} & \\ \dashrightarrow & G'_p & \xrightarrow{j} & G_p & \xrightarrow{\rho} & G''_p & \xrightarrow{\partial'} & G'_{p-1} & \dashrightarrow \end{array}$$

1.18.

$$\dashrightarrow H'_p \xrightarrow{\Delta} H_p \oplus G'_p \xrightarrow{\nabla} G_p \xrightarrow{\overline{\partial}} H'_{p-1} \dashrightarrow$$

1.19.

$$\dashrightarrow ker(\partial_{q+1}) \oplus im(\partial_{q+1}) \longrightarrow ker(\partial_q) \oplus im(\partial_q) \longrightarrow ker(\partial_{q-1}) \oplus im(\partial_{q-1})$$

1.20.

$$\begin{array}{ccccccccc}
\cdots\to & ker(\partial_{q+1}) & \longrightarrow & 0 & & & & & \\
& \oplus & & & & & & & \\
0 \longrightarrow & im(\partial_{q+1}) & \hookrightarrow & ker(\partial_q) & \longrightarrow & 0 & & & \\
& & & \oplus & & & & & \\
& & 0 \longrightarrow & im(\partial_q) & \hookrightarrow & ker(\partial_{q-1}) & \longrightarrow & 0 &
\end{array}$$

1.21.

$$\begin{array}{ccc}
H_q(X,A) & \xrightarrow{d_{(X,A)}} & H_{q-1}(A) \\
{\scriptstyle j_*}\downarrow & & \downarrow{\scriptstyle j_*} \\
H_q(X,A) & \xrightarrow[d_{(X,A,B)}]{} & H_{q-1}(A,B)
\end{array}$$

1.22.

$$\begin{array}{ccc}
H_q(X,A) & \xrightarrow{d_{(X,A)}} & H_{q-1}(A) \\
& {\scriptstyle d_{(X,A,B)}}\searrow & \downarrow{\scriptstyle j_*} \\
& & H_{q-1}(A,B)
\end{array}$$

1.23.

$$0 \longrightarrow C_*(X) \xrightarrow{p} C_*(X) \xrightarrow{\pi} C_*(X)/pC_*(X) \longrightarrow 0$$

1.24.

$$(\ 0 \longrightarrow pC_*(X) \xhookrightarrow{\iota} C_*(X) \xrightarrow{\pi} C_*(X)/pC_*(X) \longrightarrow 0\ )$$

1.25.

$$\cdots\to H_q(X) \xrightarrow{p_*} H_q(X) \xrightarrow{\pi_*} H_q(C_*(X)/pC_*(X)) \cong H_q(X;) \xrightarrow{d} H_{q-1}(X) \cdots\to$$

1.26.

$$\begin{array}{ccccccccc}
0 & \longrightarrow & H_q(X)/pH_q(X) & \xrightarrow{i} & H_q(X,) & \xrightarrow{d} & {}_p(H_{q-1}(X)) & \longrightarrow & 0 \\
\downarrow & & \downarrow\sim & & \downarrow\hat{f}_* & & \downarrow\sim & & \downarrow \\
0 & \longrightarrow & H_q(Y)/pH_q(Y) & \xrightarrow{i} & H_q(Y,) & \xrightarrow{d} & {}_p(H_{q-1}(Y)) & \longrightarrow & 0
\end{array}$$

1.27.

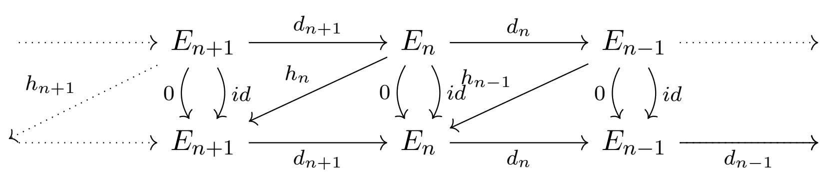
$$\begin{array}{ccccccccccc}
\cdots\rightarrow & H_q(A) & \longrightarrow & H_q(X) & \longrightarrow & H_q(X,A) & \longrightarrow & H_{q-1}(A) & \longrightarrow & H_{q-1}(X) & \cdots\rightarrow \\
 & \downarrow f|_{A*} & & \downarrow f_* & & \downarrow f_* & & \downarrow f|_{A*} & & \downarrow f_* & \\
\cdots\rightarrow & H_q(B) & \longrightarrow & H_q(Y) & \longrightarrow & H_q(Y,B) & \longrightarrow & H_{q-1}(B) & \longrightarrow & H_{q-1}(Y) & \cdots\rightarrow
\end{array}$$

1.28.

$$\cdots\cdots\rightarrow H_q(X\times\mathbb{S}^{n-1}, X\times *) \longrightarrow H_q(X\times D_n^{+\varepsilon}, X\times D_1^{+\varepsilon})\oplus H_q(X\times D_n^{-\varepsilon}, X\times D_1^{-\varepsilon})$$

$$\longrightarrow H_q(X\times\mathbb{S}^{n}, X\times *) \longrightarrow H_{q-1}(X\times\mathbb{S}^{n-1}, X\times *) \longrightarrow H_{q-1}(X\times D_n^{+\varepsilon}, X\times D_1^{+\varepsilon})\oplus H_{q-1}(X\times D_n^{-\varepsilon}, X\times D_1^{-\varepsilon})$$

1.28.



1.30.

$$0 \cdots\rightarrow \bigoplus_{\binom{n+1}{m+1}}\mathbb{Z} \longrightarrow \bigoplus_{\binom{n+1}{m}}\mathbb{Z} \cdots\rightarrow \cdots \cdots\rightarrow \cdots \bigoplus_{\binom{n+1}{1}}\mathbb{Z} \longrightarrow 0$$

1.31.

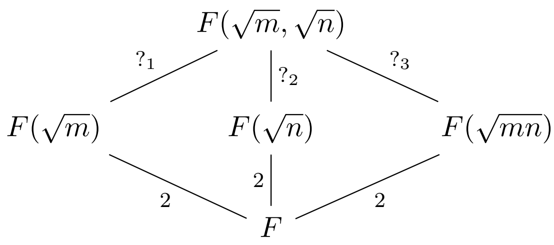
$$\cdots\rightarrow 0 \longrightarrow \mathbb{Z} \xrightarrow{A} \mathbb{Z}\oplus\mathbb{Z}\oplus\mathbb{Z}\oplus\mathbb{Z}\oplus\mathbb{Z} \xrightarrow{B} \mathbb{Z}\oplus\mathbb{Z}\oplus\mathbb{Z} \longrightarrow 0$$

1.32.

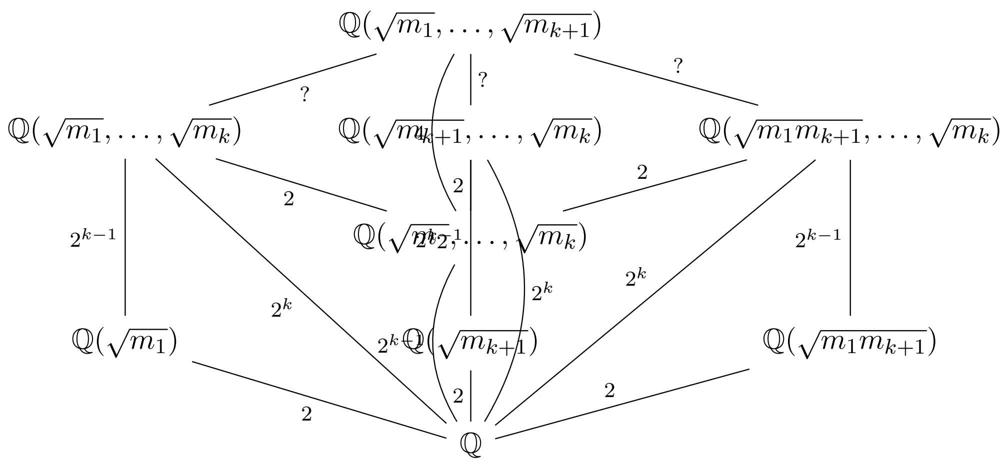
$$\cdots\rightarrow 0 \longrightarrow \mathbb{Z} \xrightarrow{C} \mathbb{Z}\oplus\mathbb{Z}\oplus\mathbb{Z} \xrightarrow{D} \mathbb{Z} \longrightarrow 0$$

1.33.

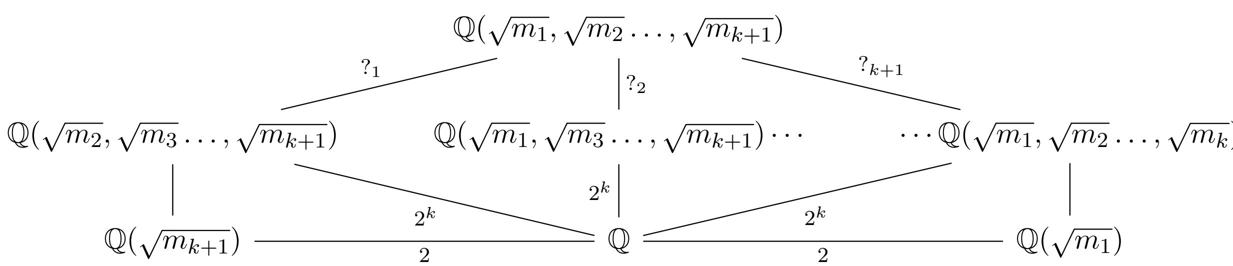
2. Galois Diagrams



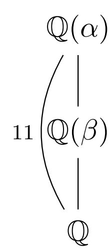
2.1.



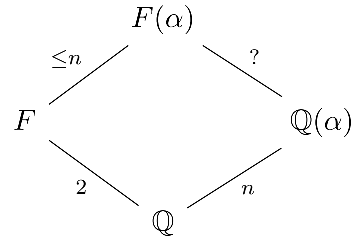
2.2.



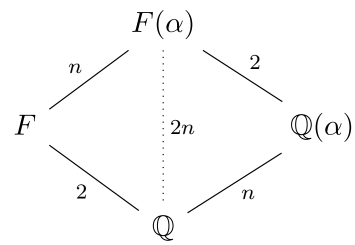
2.3.



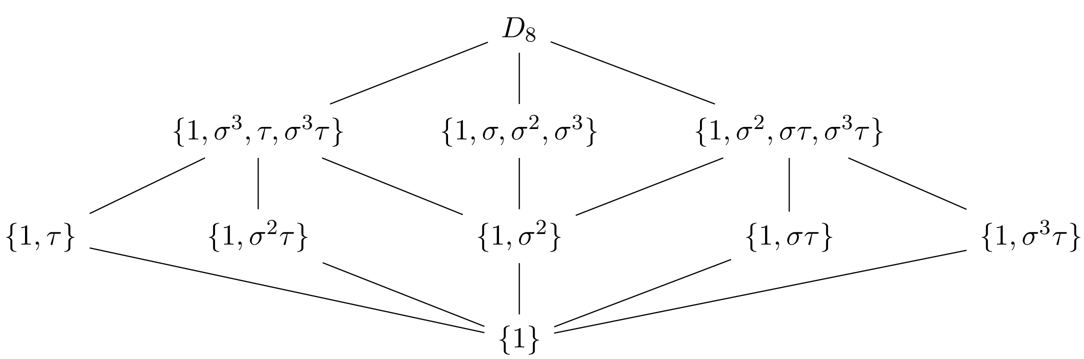
2.4.


$F(\alpha)$
$\leq n$
?
F
$\mathbb{Q}(\alpha)$
2
n
$\mathbb{Q}$

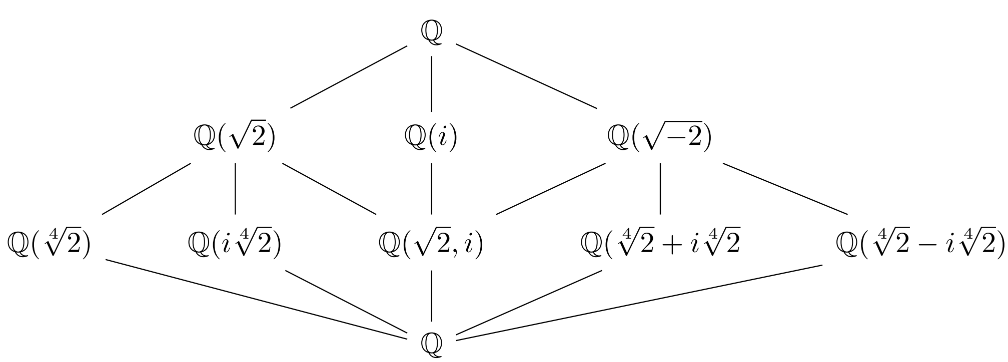
2.5.


$F(\alpha)$
n
2
F
$2n$
$\mathbb{Q}(\alpha)$
2
n
$\mathbb{Q}$

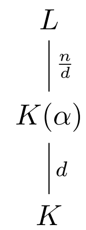
2.6.


D_8
$\{1, \sigma^3, \tau, \sigma^3\tau\}$
$\{1, \sigma, \sigma^2, \sigma^3\}$
$\{1, \sigma^2, \sigma\tau, \sigma^3\tau\}$
$\{1, \tau\}$
$\{1, \sigma^2\tau\}$
$\{1, \sigma^2\}$
$\{1, \sigma\tau\}$
$\{1, \sigma^3\tau\}$
$\{1\}$

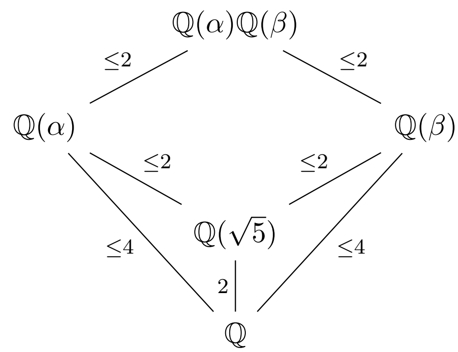
2.7.


$\mathbb{Q}$
$\mathbb{Q}(\sqrt{2})$
$\mathbb{Q}(i)$
$\mathbb{Q}(\sqrt{-2})$
$\mathbb{Q}(\sqrt[4]{2})$
$\mathbb{Q}(i\sqrt[4]{2})$
$\mathbb{Q}(\sqrt{2}, i)$
$\mathbb{Q}(\sqrt[4]{2} + i\sqrt[4]{2})$
$\mathbb{Q}(\sqrt[4]{2} - i\sqrt[4]{2})$
$\mathbb{Q}$

2.8.



2.9.



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