Errata for High-dimensional Knot Theory
by Andrew Ranicki
Springer Mathematical Monograph (1998)

This list contains corrections of misprints/errors in the book. Please let me know of any further misprints/errors by e-mail to a.ranicki@ed.ac.uk
The current electronic edition of the book is at
http://www.maths.ed.ac.uk/~aar/books/knot.pdf

A.A.R. 23.4.2017

p. V The following statement of Frank Adams makes the dedication of the book to him even more appropriate: *Of course, from the point of view of the rest of mathematics, knots in higher-dimensional space deserve just as much attention as knots in 3-space* (Article on topology, in 'Use of Mathematical Literature' (Butterworths (1977)).

p. XVIII l. 8 Remove "that of".

p. XXI l. 9 for a homology framed knot

p. XXIV l. –3 $\pi_1(X)$

p. XXV l. –2 C_{4*+1}, C_{4*+3}

p. XXVI l. 10 $\pi_1(F) = \{1\}$

p. XXVIII l. 2 chain *complex*

p. 9 l. 8 i.e. $f_* : \pi_1(X) \to \pi_1(X)$ is an isomorphism and

$$\pi_1(T(f)) \;=\; \{gz^j \,|\, j \in \mathbb{Z}\}$$

with $z^{-1}gz = f_*(g)$

p. 10 l. –7 $(f(x), n+1, 0)$

p. 16 l. –15 If X has a finite 2-skeleton

p. 29 l. –10 for

p. 31 l. 11 Bass [13, XII.7.4]

p. 34 l. 6 4.5, 5.5 (i)

p. 34 l. 19 As for 5.10

p. 35 l. –12 $\mathrm{Nil}_0(A)$

p. 47 l. –6 $z^{-N_2^+}b_2$

p. 47 l. –2 $N^+ = \sum\limits_{j=1}^{r} N_j^+$

p. 49 ll. 1,2 Replace by

$$d_E(\sum_{j=-N_r^+}^{N_r^-} z^j F_r) \subseteq \sum_{j=-N_{r-1}^+}^{N_{r-1}^-} z^j F_{r-1} \quad (r = n, n-1, \dots, 0)$$

for some integers $N_r^+, N_r^- \geq 0$ (starting with $N_n^+ = N_n^- = 0$, for example).

p. 73 l. 17 Replace [297, 9.14] by [297, 7.9]

p. 77 Example 9.15 As before, let $A = B[z]$, and let Σ be the set of B-invertible square matrices in A, with $A \to B; z \to 0$. The identity

$$\Sigma^{-1}A \;=\; (1 + zB[z])^{-1}B[z]$$

is correct for commutative B. For noncommutative B it should be replaced by the direct limit

$$\Sigma^{-1}A \;=\; \lim nR_n$$

with $R_0, R_1, R_2, \dots$ the rings defined inductively by

$$\begin{aligned} &R_0 \;=\; B[z] \;\;,\;\; p_0 \;:\; R_0 \to B \;;\; z \to 0 \;, \\ &R_n = (1 + \ker(p_{n-1}))^{-1}R_{n-1} \;\;,\;\; p_n \;:\; R_n \to B \;;\; z \to 0 \;. \end{aligned}$$

(In particular, $R_1 = (1+zB[z])^{-1}B[z]$.) Given an $n \times n$ matrix $b = (b_{ij})$ in B let $b' = (b'_{ij})$ be the $(n-1) \times (n-1)$ matrix in R_1 defined by the matrix equation

$$\begin{pmatrix} 1 & 0 & \dots & zb_{1n}(1 - zb_{nn})^{-1} \\ 0 & 1 & \dots & zb_{2n}(1 - zb_{nn})^{-1} \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 \end{pmatrix} \begin{pmatrix} 1 - zb_{11} & -zb_{12} & \dots & -zb_{1n} \\ -zb_{21} & 1 - zb_{22} & \dots & -zb_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ -zb_{n1} & -zb_{n2} & \dots & 1 - zb_{nn} \end{pmatrix}$$

$$= \begin{pmatrix} 1 - zb'_{11} & -zb'_{12} & \dots & 0 \\ -zb'_{21} & 1 - zb'_{22} & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ -zb_{n1} & -zb_{n2} & \dots & 1 - zb_{nn} \end{pmatrix} .$$

Assuming inductively that it is possible to invert $1 - zb'$ in R_{n-1} it is now possible to invert $1 - zb$ in R_n. The inclusion $B[z] \to B[[z]]$ factors as

$$B[z] \to \Sigma^{-1}B[z] \to B[[z]]$$

so that $B[z] \to \Sigma^{-1}B[z]$ is injective. The morphism $\Sigma^{-1}B[z] \to B[[z]]$ is an injection for commutative B, but it is not known if it is an injection also in the noncommutative case.

p. 82 l. 4 Remove "the $A[z^{-1}]$-module subcomplex of".

p. 83 l. 3 “$A[z]$-module morphisms”.

p. 84 l. 7 Proposition 10.9. For noncommutative A the right hand side of the identity

$$\widetilde{\Omega}_+^{-1}A[z] \;=\; (1+zA[z])^{-1}A[z]$$

should be corrected as for Example 9.15 above.

p. 90 l. 12 Replace ”[240, Chap. 8]” by ”[244, Chap. 8]”

p. 92 l. 12 $\tau(1-f+zf:\Pi^{-1}P[z,z^{-1}]\to\Pi^{-1}P[z,z^{-1}])$

p. 99 l. –1 $\in A[z]$

p. 102 l. –8 [5, 1.10]

p. 102 l. –4 Replace “If the additive group of A is torsion-free ...” by “If $\mathbb{Q}\subseteq A$ ...”

p. 111 l. 8 Remove “(P,f) is”

p. 120 l. –8 Replace 13.2 by 13.1

p. 121 l. 2 $n-m\geqslant 1$

p. 121 l. 5, l. 10 $\Omega^{-1}A[z,z^{-1}]$

p. 121 l. –3 $A[z,z^{-1}]$-module

p. 123 l. –12 $P^{-1}A[z,z^{-1}]=\Pi^{-1}A[z,z^{-1}]$

p. 125 l. -13 Should read ”$(P,h)+(P',h') \;=\; (P\oplus P',\begin{pmatrix} g & h \\ 0 & g'\end{pmatrix})$”

p. 135 Chapter 14 The group $\widehat{W}(A)^{ab}$ should be replaced by the image of $\widehat{W}(A)$ in $K_1(A[[z]])$, since the kernel of the morphism

$$\begin{aligned}\widetilde{\Delta}_+ \;:\; \widehat{W}(A)\to K_1(A[[z]])\;;\\ (a_1,a_2,\dots)\mapsto \tau(1+\sum_{j=1}^{\infty}a_jz^j : A[[z]]\to A[[z]])\end{aligned}$$

is in general larger than $[\widehat{W}(A),\widehat{W}(A)]$. See the paper
A.Pajitnov and A.Ranicki, *The Whitehead group of the Novikov ring*
http://arXiv.org/abs/math.AT.0012031, K-theory 21, 325–365 (2000).
Similarly, $W(A)^{ab}$ should be replaced by the image of $W(A)$ in $K_1(\widetilde{\Omega}_+^{-1}A[z])$, since the kernel of the morphism

$$\begin{aligned}\widetilde{\Delta}_+ \;:\; W(A)\to K_1(\widetilde{\Omega}_+^{-1}A[z])\;;\\ (a_1,a_2,\dots)\mapsto \tau(1+\sum_{j=1}^{\infty}a_jz^j : \widetilde{\Omega}_+^{-1}A[z]\to \widetilde{\Omega}_+^{-1}A[z])\end{aligned}$$

is in general larger than $[W(A),W(A)]$.

p. 136 l. –7 Replace by "If A is a commutative ring such that $\mathbb{Q} \subseteq A$".
The isomorphism inverse to

$$\begin{aligned}
&\prod_1^\infty A \to \widehat{W}(A)\ ;\\
&(a_1, a_2, a_3, \dots) \mapsto \exp\Big(\textstyle\int_0^z (a_1 - a_2 s + a_3 s^2 - \dots)ds\Big)\\
&\qquad\qquad\qquad\qquad\qquad = \exp\Big(a_1 z - \tfrac{a_2 z^2}{2} + \tfrac{a_3 z^3}{3} - \dots\Big)
\end{aligned}$$

is given by

$$\begin{aligned}
&\widehat{W}(A) \to \prod_1^\infty A\ ;\ q(z) \ = \ 1 + b_1 z + b_2 z^2 + \dots \mapsto\\
&\frac{q'(z)}{q(z)} \ = \ \frac{b_1 + 2b_2 z + 3b_3 z^2 + \dots}{1 + b_1 z + b_2 z^2 + \dots} \ = \ a_1 - a_2 z + a_3 z^2 - \dots \to (a_1, a_2, a_3, \dots)
\end{aligned}$$

([5, 6.13]). The reverse characteristic polynomial of an endomorphism $f : P \to P$ of a f.g. projective A-module P

$$\begin{aligned}
\widetilde{\mathrm{ch}}_z(P, f) \ &= \ \det(1 - zf : P[z] \to P[z]) \ = \ \exp\Big(-\sum_{i=1}^\infty \tfrac{\mathrm{tr}(f^i)}{i} z^i \Big)\\
&\in 1 + zA[z] \subset W(A) \subset \widehat{W}(A)
\end{aligned}$$

(cf. Example 19.16) has image $(-\mathrm{tr}(f), \mathrm{tr}(f^2), -\mathrm{tr}(f^3), \dots) \in \prod_1^\infty A$. For any polynomial of the type

$$p(z) \ = \ 1 + \sum_{i=1}^d b_i z^i \in 1 + zA[z] \subset W(A)$$

the image $(a_1, a_2, a_3, \dots) \in \prod_1^\infty A$ has components

$$a_i \ = \ (-)^i \mathrm{tr}(f^i) \in A$$

with

$$f \ = \ z \ : \ P \ = \ A[z]/(z^d p(z^{-1})) \to P \ = \ A[z]/(z^d p(z^{-1}))$$

such that $\widetilde{\mathrm{ch}}_z(P, f) = p(z)$.

p. 136 l. –1 2.2.5

p. 141 l. –8 For noncommutative A the right hand side of the identity

$$\widetilde{\Omega}_+^{-1} A[z] \ = \ (1 + zA[z])^{-1} A[z]$$

should be corrected as for Example 9.15 above.

p. 142 l. 16 This ζ-function agrees with the ζ-function of Geoghegan and Nicas (*Trace and torsion in the theory of flows*, Topology 33, 683–719 (1994)).

p. 153 l. –3 [244, Chap.20]

p. 160 l. 17 *structure* ϕ_B *on* $B \otimes_A C$.

p. 172 l. 3 $D[z,z^{-1}] \to D[z,z^{-1}]$

p. 173 l. 13 for each $P^{-1}E_r$

p. 175 l. –5 the reduced chain complexes

p. 207 l. 5 $d_{C^{n-*}} = (-)^r (d_C)^*$

p. 211 l. 5 A *cobordism* of ϵ-symmetric Poincaré complexes (C,ϕ), (C',ϕ') is an ϵ-symmetric Poincaré pair $((f\ f') : C \oplus C' \to D, (\delta\phi, \phi \oplus -\phi'))$.

p. 223 l. 12,13 f is i-connected, $\partial_0 f, \partial_1 f$ are $(i-1)$-connected

p. 241 l. –6 Szczarba

p. 248 l. –7 i-connected

p. 249 l. 14 i-connected

p. 258 l. –6 $g \times 1$

p. 261 l. 2 A-finitely dominated

p. 269 Proposition 25.4 The stated exact sequence in the ϵ-symmetric case

$$\ldots \to L^n_{jU}(A,\epsilon) \xrightarrow{i} L^n_{\partial^{-1}U}(\Sigma^{-1}A,\epsilon) \xrightarrow{\partial} L^n_U(A,\Sigma,\epsilon) \xrightarrow{j} L^{n-1}_{jU}(A,\epsilon) \to \ldots$$

should be replaced in general by the exact sequence

$$\ldots \to L^n_{jU}(A,\epsilon) \xrightarrow{i} \Gamma^n_{\partial^{-1}U}(A \to \Sigma^{-1}A,\epsilon) \xrightarrow{\partial} L^n_U(A,\Sigma,\epsilon) \xrightarrow{j} L^{n-1}_{jU}(A,\epsilon) \to \ldots .$$

See the paper
Noncommutative localization and chain complexes I. Algebraic K- and L-theory by A.Neeman and A.Ranicki, http://arXiv.org/abs/math.RA.0109118 for the proof that the natural map of ϵ-symmetric groups

$$\Gamma^n_{\partial^{-1}U}(A \to \Sigma^{-1}A,\epsilon) \to L^n_{\partial^{-1}U}(\Sigma^{-1}A)$$

is an isomorphism if $\mathrm{Tor}^A_*(\Sigma^{-1}A,\Sigma^{-1}A) = 0$ for $* \geq 1$ (e.g. if $\Sigma^{-1}A$ is a flat A-module, as is the case for a two-sided Ore localization). There is no problem in the ϵ-quadratic case, by virtue of Vogel [296], [297], with the natural maps

$$\Gamma^{\partial^{-1}U}_n(A \to \Sigma^{-1}A,\epsilon) \to L^{\partial^{-1}U}_n(\Sigma^{-1}A)$$

isomorphisms, and with an exact sequence

$$\ldots \to L^{jU}_n(A,\epsilon) \xrightarrow{i} L^{\partial^{-1}U}_n(\Sigma^{-1}A,\epsilon) \xrightarrow{\partial} L^U_n(A,\Sigma,\epsilon) \xrightarrow{j} L^{jU}_{n-1}(A,\epsilon) \to \ldots .$$

p. 275 l. –13 $1 + T_\epsilon : L_n^U(A[s], \epsilon) \to L_U^n(A[s], \epsilon)$

p. 287 l. 3 Replace "will" by "we shall"

p. 290 l. –11,12 Replace conditions (a),(b) by the single condition '$\lambda(x, y) = 0$ for all $x, y \in K$'.

p. 291 l. –5 Should read "[235, Chap. 9]"

p. 303 l. 4 *to* describe

p. 312 l. 14 i-connected

p. 313 l. 8 i-connected

p. 313 l. 10 $(i + 1)$-connected

p. 314 l. 5 $(\mathbb{Z}^\ell, \lambda)$

p. 314 l. 16 Cyclic branched covers

p. 340 l. 15 Replace "28.15" by "28.17"

p. 342 l. –6 Replace "band" by "complex"

p. 344 l. 8 Replace the text of Example 28.31 by

"The 0-dimensional asymmetric L-group $LAsy_q^0(A)$ ($q = s, h, p$) is the *Witt group* of nonsingular asymmetric forms (L, λ) over A, with $\lambda : L \to L^*$ an isomorphism. Such a form is *metabolic* if there exists a *lagrangian*, i.e. a direct summand $K \subset L$ such that $K = K^\perp$, with

$$K^\perp = \{x \in L \,|\, \lambda(x)(K) = 0\} ,$$

in which case

$$(L, \lambda) = 0 \in LAsy_q^0(A) .$$

A nonsingular asymmetric form (L, λ) is such that $(L, \lambda) = 0 \in LAsy_q^0(A)$ if and only if it is stably metabolic, i.e. there exists an isomorphism

$$(L, \lambda) \oplus (M, \mu) \cong (M', \mu')$$

for some metabolic (M, μ), (M', μ'). A 0-dimensional asymmetric Poincaré complex (C, λ) is the same as a nonsingular asymmetric form (L, λ) with $L = C^0$. For a 1-dimensional asymmetric Poincaré pair $(f : C \to D, (\delta\lambda, \lambda))$ with $D_r = 0$ for $r \neq 0$ there is defined an exact sequence

$$0 \to D^0 \xrightarrow{f^*} C^0 \xrightarrow{f\lambda} D_0 \to 0$$

so that $K = \mathrm{im}(f^* : D^0 \to C^0) \subset L = C^0$ is a lagrangian of (C^0, λ), and the pair is the same as a nonsingular asymmetric form together with a lagrangian. More generally, suppose given a 1-dimensional asymmetric

Poincaré pair $(f : C \to D, (\delta\lambda, \lambda))$. The mapping cone of the chain equivalence $\begin{pmatrix} \delta\lambda & f\lambda \end{pmatrix} : \mathcal{C}(f)^{1-*} \to D$ is an exact sequence

$$0 \to D^0 \xrightarrow{\quad g \quad} C^0 \oplus D^1 \oplus D_1 \xrightarrow{\quad h \quad} D_0 \to 0$$

with

$$\begin{aligned} g &= \begin{pmatrix} f^* \\ d^* \\ \delta\lambda \end{pmatrix} : D^0 \to C^0 \oplus D^1 \oplus D_1 \ , \\ h &= \begin{pmatrix} f\lambda & \delta\lambda & d \end{pmatrix} : C^0 \oplus D^1 \oplus D_1 \to D_0 \ . \end{aligned}$$

However (as pointed out by Joerg Sixt), in general

$$h \neq g^* \begin{pmatrix} \lambda & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} : C^0 \oplus D^1 \oplus D_1 \to D_0$$

so that g is not the inclusion of a lagrangian in $(C^0, \lambda) \oplus (D^1 \oplus D_1, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix})$. To repair this, proceed as follows. Use the chain equivalences

$$\begin{pmatrix} \delta\lambda \\ \lambda f^* \end{pmatrix} : D^{1-*} \to \mathcal{C}(f) \ , \ \begin{pmatrix} \delta\lambda & f\lambda \end{pmatrix} : \mathcal{C}(f)^{1-*} \to D$$

to define a chain equivalence

$$i = T \begin{pmatrix} \delta\lambda \\ \lambda f^* \end{pmatrix} \begin{pmatrix} \delta\lambda & f\lambda \end{pmatrix}^{-1} : D \to D \ .$$

In order to prove that (C^0, λ) is stably metabolic, it is convenient to replace D by a chain equivalent complex for which i is (chain homotopic to) an isomorphism. The exact sequence

$$0 \to D_1 \xrightarrow{\begin{pmatrix} d \\ i_1 \end{pmatrix}} D_0 \oplus D_1 \xrightarrow{\begin{pmatrix} i_0 & -d \end{pmatrix}} D_0 \to 0$$

splits, so there exists an A-module morphism $\begin{pmatrix} \alpha & \beta \end{pmatrix} : D_0 \oplus D_1 \to D_1$ such that

$$\begin{pmatrix} \alpha & \beta \end{pmatrix} \begin{pmatrix} d \\ i_1 \end{pmatrix} = \alpha d + \beta i_1 = 1 : D_1 \to D_1 \ .$$

The 1-dimensional A-module chain complex D' defined by

$$d' = \begin{pmatrix} d & 0 \\ 0 & 1 \end{pmatrix} : D'_1 = D_1 \oplus D_1 \to D'_0 = D_0 \oplus D_1$$

is such that the inclusion $D \to D'$ and the projection $D' \to D$ are inverse chain equivalences. The chain isomorphism $i' : D' \to D'$ defined by

$$\begin{aligned} i'_0 &= \begin{pmatrix} i_0 & -d \\ \alpha & \beta \end{pmatrix} : D'_0 = D_0 \oplus D_1 \to D'_0 = D_0 \oplus D_1 \ , \\ i'_1 &= \begin{pmatrix} i_1 & -1 \\ \alpha d & \beta \end{pmatrix} = \begin{pmatrix} 0 & -1 \\ 1 & \beta \end{pmatrix} \begin{pmatrix} 1 & 0 \\ -i_1 & 1 \end{pmatrix} \\ &\qquad : D'_1 = D_1 \oplus D_1 \to D'_1 = D_1 \oplus D_1 \end{aligned}$$

is such that

$$i : D \to D' \xrightarrow{i'} D' \to D \ .$$

Replacing D by D' and reverting to the previous notation, it may thus be assumed that $i : D \to D$ is an isomorphism. Choose a chain homotopy

$$\begin{pmatrix} j & k \end{pmatrix} : i \begin{pmatrix} \delta\lambda & f\lambda \end{pmatrix} \simeq T \begin{pmatrix} \delta\lambda \\ \lambda f^* \end{pmatrix} : \mathcal{C}(f)^{1-*} \to D \ .$$

The nonsingular asymmetric form defined by

$$(M, \mu) = (C^0 \oplus D^1 \oplus D_1, \begin{pmatrix} \lambda & k^* & 0 \\ 0 & j^* & 1 \\ 0 & i_1^* & 0 \end{pmatrix})$$

is such that

$$h = g^*\mu : M = C^0 \oplus D^1 \oplus D_1 \to D_0$$

so that $g : D^0 \to M$ is the inclusion of a lagrangian and (M, μ) is metabolic. The A-module morphism

$$C^0 \oplus D_1 \to C^0 \oplus M = C^0 \oplus C^0 \oplus D^1 \oplus D_1 \ ; \ (x, y) \mapsto (x, x, 0, y)$$

is the inclusion of a lagrangian in $(C^0, \lambda) \oplus (M, -\mu)$, so that (C^0, λ) is stably metabolic."

p. 346 l. 16 Replace 25.11 by 26.11

pp. 347–348 The construction of (C', λ') and (C'', λ'') is not correct in general; these complexes should be replaced by the following $(i-1)$-connected n-dimensional asymmetric Poincaré complex (C', λ') cobordant to the given n-dimensional asymmetric Poincaré complex (C, λ) with $n = 2i$ or $2i + 1$. Choose a chain homotopy inverse $\mu : C \to C^{n-*}$ for $\lambda : C^{n-*} \to C$ and a chain homotopy

$\nu : \mu\lambda \simeq 1 : C^{n-*} \to C^{n-*}$, and set

$$d_{C'} \;=\; \begin{cases} \begin{pmatrix} d_C & (-)^{r-1}\lambda \\ 0 & d_C^* \end{pmatrix} : C'_r \;=\; C_r \oplus C^{n-r+1} \to C'_{r-1} \;=\; C_{r-1} \oplus C^{n-r+2} \\ \qquad \text{if } r \leq i-1 \\ \begin{pmatrix} d_C & (-)^{i-1}\lambda & 0 \\ 0 & d_C^* & 0 \end{pmatrix} : C'_r \;=\; C_i \oplus C^{i+1} \oplus C_{i+1} \to C'_{r-1} \;=\; C_{i-1} \oplus C^{i+2} \\ \qquad \text{if } n = 2i \text{ and } r = i \\ \begin{pmatrix} d_C & 0 \\ 0 & 0 \\ (-)^i \lambda^* \mu & d_C \end{pmatrix} : C'_r \;=\; C_{i+1} \oplus C_{i+2} \to C'_{r-1} \;=\; C_i \oplus C^{i+1} \oplus C_{i+1} \\ \qquad \text{if } n = 2i \text{ and } r = i+1 \\ \begin{pmatrix} d_C & 0 \\ 0 & 0 \end{pmatrix} : C'_r \;=\; C_{i+1} \oplus C_{i+2} \to C'_{r-1} \;=\; C_i \oplus C^{i+2} \\ \qquad \text{if } n = 2i+1 \text{ and } r = i+1 \\ \begin{pmatrix} d_C & 0 \\ (-)^{r-1}\lambda^* \mu & d_C \end{pmatrix} : C'_r \;=\; C_r \oplus C_{r+1} \to C'_{r-1} \;=\; C_{r-1} \oplus C_r \\ \qquad \text{otherwise,} \end{cases}$$

$$\lambda' \;=\; \begin{cases} \begin{pmatrix} \lambda & 0 \\ 0 & \mu^*\lambda \end{pmatrix} : C'^{n-r} \;=\; C^{n-r} \oplus C^{n-r+1} \to C'_r \;=\; C_r \oplus C^{n-r+1} \\ \qquad \text{if } r \leq i-1 \\ \begin{pmatrix} \lambda & 0 & 0 \\ 0 & 0 & \mu^*\lambda \\ \lambda^*\nu & 1 & 0 \end{pmatrix} : \\ \quad C'^{n-r} \;=\; C^i \oplus C_{i+1} \oplus C^{i+1} \to C'_r \;=\; C_i \oplus C^{i+1} \oplus C_{i+1} \\ \qquad \text{if } n = 2i \text{ and } r = i \\ \begin{pmatrix} \lambda & 0 \\ \lambda^*\nu & 1 \end{pmatrix} : C'^{n-r} \;=\; C^{n-r} \oplus C_{r+1} \to C'_r \;=\; C_r \oplus C_{r+1} \\ \qquad \text{otherwise.} \end{cases}$$

p. 355 ll. –1,–11,–12 $F \cup_\partial -N$, $T(h) \cup_\partial -(N \times S^1)$

p. 357 ll. 4,12 $F \cup -F$

p. 364 l. –13 $(i+1)$-connected

p. 369 l. 12 $S^3 \times D^4 \cup_{h_1} -(S^3 \times D^4)$

p. 369 l. –1 framed codimension 2

p. 372 l. 3 replace "reverse" by "reduced"

p. 374 l. 8 "twisted double bordism groups"

p. 382 l. 17

$$\beta_s \;=\; \begin{pmatrix} \chi_s & (-)^s\phi_s \\ (-)^{n-r-1}\phi_s & (-)^{n-r+s}T_\epsilon\phi_{s-1} \end{pmatrix} \;: \\ B^{n-r+s} \;=\; C^{n-r+s}\oplus C^{n-r+s-1}\to B_r \;=\; C_r\oplus C_{r-1}\ .$$

p. 411 l. 10 $\Omega_+^{-1}A[s]/A[s]=F(s)/F[s]$

p. 421 l. 8 Terminology: the covering ϵ-symmetric complex in the sense of Definition 32.7 (i) is the ϵ-symmetrization of the ultraquadratic complex of Ranicki[237, p.820].

p. 422 l. 9 Proof of 32.8 (ii): Since E is A-contractible the $A[z,z^{-1}]$-module chain map $1-z:E\to E$ is a chain equivalence. Define a homotopy equivalence $(E,\theta)\simeq U(\Gamma)$ by

$$\big(1\oplus(1+T_\epsilon)\big)(1-z)^{-1}\ :\ E\ \to\ \mathcal{C}(g-zh)\ ,$$

with $(1-z)^{-1}:E\to E$ any chain homotopy inverse of $1-z:E\to E$.

p. 437 l. –2 In the proof of (ii) insert :
The natural $A[s]$-module morphisms

$$A[s,s^{-1},(1-s)^{-1}]\to Q_A^{-1}A[s]\ ,\ Q_{A,min}^{-1}A[s]\to Q_A^{-1}A[s]$$

are inclusions of submodules. For any elements

$$\frac{r(s)}{s^j(1-s)^k}\in A[s,s^{-1},(1-s)^{-1}]\quad ,\quad \frac{p(s)}{q(s)}\in Q_{A,min}^{-1}A[s]$$

such that

$$\frac{r(s)}{s^j(1-s)^k}\;=\;\frac{p(s)}{q(s)}\in Q_A^{-1}A[s]$$

it follows from the minimality of $q(s)$ and the identity

$$p(s)s^j(1-s)^k\;=\;q(s)r(s)\in A[s]$$

that $s^j(1-s)^k$ divides $r(s)$, and hence that

$$A[s,s^{-1},(1-s)^{-1}]\cap Q_{A,min}^{-1}A[s]\;=\;A[s]\subset Q_A^{-1}A[s]\ .$$

p. 438 l. –1 – –9 Remove. ($\chi_{s,min}$ is no longer required).

p. 439 l. 12 The statement of Proposition 32.45 (i) is false as stated, and should be replaced by :

"The Blanchfield form is such that for any $x, y \in L$ the composite

$$\begin{aligned} & P_A^{-1}A[z,z^{-1}]/A[z,z^{-1}] \\ & \to P_F^{-1}[z,z^{-1}]/F[z,z^{-1}] \ = \ Q_{F,min}^{-1}[s]/F[s] \ = \ F[s]_{(s,1-s)}/F[s] \\ & \to F((s))/F[s] \ = \ s^{-1}F[[s^{-1}]] \end{aligned}$$

sends $\mu(i(x), i(y)) \in P_A^{-1}A[z,z^{-1}]/A[z,z^{-1}]$ to

$$\mu(i(x), i(y)) \ = \ \sum_{j=-\infty}^{-1} (\lambda+\epsilon\lambda^*)(x, f^{-j-1}(y))s^j \in s^{-1}A[[s^{-1}]] \subset s^{-1}F[[s^{-1}]] \ ,$$

where $i : L \to M$ is the natural A-module morphism. In particular, μ determines λ by

$$\lambda \ : \ L \times L \overset{i\times si}{\to} M \times M \overset{\mu}{\to} P_A^{-1}A[z,z^{-1}]/A[z,z^{-1}] \to F((s))/F[s] \overset{\chi_s}{\to} F$$

with $s = (1-z)^{-1} : M \to M$ and χ_s = coefficient of s^{-1} (31.20)."

Here is an explicit counterexample to the original statement of 32.45 (i). Let $A = \mathbb{Z}$, and for any $m \in \mathbb{Z}$ consider the skew-symmetric Seifert form over $\mathbb{Z}$ defined in Example 42.2

$$(L, \lambda) \ = \ (\mathbb{Z} \oplus \mathbb{Z}, \begin{pmatrix} m & 0 \\ -1 & 1 \end{pmatrix})$$

with

$$f \ = \ (\lambda - \lambda^*)^{-1}\lambda \ = \ \begin{pmatrix} 1 & -1 \\ m & 0 \end{pmatrix} \ : \ L \ = \ \mathbb{Z}\oplus\mathbb{Z} \to L \ = \ \mathbb{Z}\oplus\mathbb{Z}$$

and Alexander polynomial

$$\Delta(z) \ = \ \det(1 - f + zf) \ = \ m(1-z)^2 + z \ .$$

The corresponding symmetric Blanchfield form (M, μ) is given by

$$\begin{aligned} M \ &= \ \mathrm{coker}(1 - f + zf) \ = \ \mathbb{Z}[z,z^{-1}]/\Delta(z) \ , \\ \mu(x,y) \ &= \ \tfrac{(1-z)^2xy}{\Delta(z)} \in P^{-1}\mathbb{Z}[z,z^{-1}]/\mathbb{Z}[z,z^{-1}] \ . \end{aligned}$$

In terms of $s = (1-z)^{-1}$

$$\mu(x,y) \ = \ \frac{xy}{m + s(1-s)} \in Q^{-1}\mathbb{Z}[s]/\mathbb{Z}[s] \ .$$

If $m \neq 0$ then

$$\mu(1,1) \ = \ \frac{1}{m + s(1-s)} \notin Q_{min}^{-1}\mathbb{Z}[s]/\mathbb{Z}[s] \ ,$$

since $s^2\Delta(1-s^{-1}) = m + s(1-s) \in \mathbb{Z}[s]$ is not minimal.

p. 439 l. 12 omit "the natural $A[s]$-module morphism"

p. 440 Replace the proof of 32.45 (i) by :
"Work in the completion $A[[s^{-1}]]$ to obtain

$$\begin{aligned}\mu(i(x),i(y)) &= (1-z)(\lambda+\epsilon\lambda^*)(x,(1-f+zf)^{-1}(y)) \\ &= s^{-1}(\lambda+\epsilon\lambda^*)(x,(1-s^{-1}f)^{-1}y) \\ &= \sum_{j=-\infty}^{-1}(\lambda+\epsilon\lambda^*)(x,f^{-j-1}(y))s^j \in A[[s^{-1}]]\end{aligned}$$

so that

$$\begin{aligned}\chi_s(\mu(i(x),i(y))) &= (\lambda+\epsilon\lambda^*)(x,y)\ , \\ \chi_s(\mu(i(x),si(y))) &= \lambda(x,y)\in A\subset F\ ."\end{aligned}$$

p. 450 l. –1 $1 \leq r \leq n$

p. 456 l. –2 $\delta\phi \in \mathrm{Hom}_{\mathbb{Z}[\mathbb{Z}_2]}(W, C\otimes_A C)_{n+1}$

p. 457 l. 13 $Q^*(D,-\epsilon) \ = \ Q^*_{end}(D^!,\xi,\epsilon)$

p. 467 l. 11 delete one "will"

p. 475 l. –8 "$L\mathrm{Aut}^n_p(A,\epsilon) \ = \ L^n_p(A,\epsilon)\oplus \widetilde{L\mathrm{Aut}}^n_p(A,\epsilon)$"

p. 478 l. 11 26.11 (iii) instead of 25.11 (iii)

p. 479 l. 14 26.11 instead of 25.11

p. 485 l. –12 In 36.3 and 41.19

p. 487 l. 2 By 25.11 and 26.11

p. 488 l. –10 Replace form by $\begin{pmatrix}\phi_0+\phi_1 d^* & d \\ (-)^i d^* & 0\end{pmatrix}$

p. 492 ll. 15,16 Replace char(F) by $|F|$

p. 493 l. –9 Should read 'Let s_0 be the number of conjugate pairs of non-real roots $\omega\in\mathbb{C}$ of $p(x)$ with $\sigma_\omega(F_0)\subset\mathbb{R}$ and $\sigma_\omega(a)<0$, so that $\sigma_\omega : F\to\mathbb{C}^-$ is a morphism of rings with involution.'

p. 495 l. –4 $L^0(\mathbb{Z}_4)=\mathbb{Z}_8$

p. 497 l. 7 Replace quadratic by ϵ-symmetric

p. 508 l. 5 $L^{-1}(A,\epsilon)$

p. 508 l. –11 Should read

$$\text{dimension}\, L^0(A,\epsilon) \ = \ \text{dimension}\, L^0(F,\epsilon) \ = \ r_1\ ,$$

with r_1 the number of real roots of $p_0(y)$ such that $\rho_\xi : F_0=\mathbb{Q}[y]/(p_0(y))\to\mathbb{R}; y\to\xi$ has $\rho_\xi(a)<0$. Both $L^0(A,\epsilon)$ and $L^0(F,\epsilon)$ are of the form $\mathbb{Z}^{r_1}\oplus$ 8-torsion.

p. 535 l. 14 $\phi_0 = \theta, -zf^*\theta$, $\phi_1 = \theta$.

p. 546 l. –1 identification of 28.33

p. 547 l. 2 from 39.26

p. 547 l. 12 36.3 (i)

p. 547 l. –4 as in 39.20

p. 548 l. –11 Combine 39.20, 39.26

p. 564 l. 17 $\zeta : \overline{X} \to \overline{X}$ is a generating covering translation.

p. 567 l. –3 $\lambda - \omega\lambda^*$

p. 571 l. 16 Replace $[129, 5.6]$ by [121]

p. 573 l. 10 Replace '26.10' by '27.10'.

p. 574 l. –5 Replace 'k even' by 'j even'.

p. 575 l. –12 The exact sequence should read

$$0 \to L\widetilde{\mathrm{Aut}}_p^{2j+1}(A) \to L_h^{2j+2}(A) \to L\mathrm{Asy}_h^{2j+2}(A) \to L\widetilde{\mathrm{Aut}}_p^{2j}(A) \to L_h^{2j+1}(A) \to 0$$

p. 575 l. –11 Insert 'and $L\mathrm{Asy}^{2j+1}(\mathbb{C}) = 0$ (Proposition 39.20 (iii))' after 'These identifications'

p. 598 l. –1 $n = 2i$ in the braid

p. 616 Replace $V \times 1$ in the figure caption by $V \times I$

p. 617 l. –8 – –5 Replace "Indeed ... etc." by
"Indeed, the boundary of a Bing 3-disk D^3, which we assume contains the connected binding N in its interior, also bounds a 3-disk in the complement of D^3, because $M^3 \backslash N$ is fibered and thus covered by $\mathbb{R}^3$, etc."

p. 622 Replace $W \times 1$ in the figure caption by $W \times I$

p. 623 l. 11 Replace "(Jänich, Karras et. al. [117])" by "(Jänich, Karras et. al. [117], Neumann [211])"

p. 629 l. –11 [70] M. Epple, **Die Entstehung der Knotenthorie**, Vieweg (1999)

p. 633 l. 12 [161] J. Levine and K. Orr, **A survey of surgery and knot theory**, in Surveys on Surgery Theory, Volume 1, Annals of Maths. Studies 145, 345–364 (2000)

p. 633 l. –17 [174] W. Lück, **The universal functorial Lefschetz invariant**, Fund. Math. 161, 167–215 (1999)