Errors

Chapter 1

1) page 17, def. 1.1.1: such that $(R,\cdot)$ is a commutative monoid
2) page 18, after 1.1.3: For every ring R, there exists a unique ring homomorphism ....
3) page 32, proof of prop. 1.2.7, line -3: we get $\beta_p \le \min\{\alpha_{p1},\dots,\alpha_{pm}\}$
4) page 39, tutorial 6.d, hint: ... and consider $\varepsilon(\sum_{i=1}^r g_i a_i h_i + (f))$.)
5) page 43, prop. 1.3.5, end of proof: since the first components of $v_1, v_2, \dots$ form a non-decreasing sequence.
6) page 45, cor. 1.3.10, proof, line 4: ... for every $i \ge 2$. Then we have $\langle t_2,\dots,t_i\rangle \subseteq M_i$, and therefore $t_{i+1} \notin \langle t_2,\dots,t_i\rangle$. Thus the monomial submodule $\langle t_2, t_3, \dots\rangle$ ...
7) page 55, prop. 1.4.18, proof, line 3: if there is a non-empty subset $\Sigma' \subseteq \Sigma$ having ...
8) page 77, def. 1.7.4, line 3: or simply a Γ-graded R-module if $\Sigma = \Gamma$
9) page 80, prop. 1.7.12, proof, line -4: the sum extends only over $(k,\ell) \ne (i,j)$
10) page 81, example 1.7.13, line -3: the cases $f \in R_0$, $g \in R_1$ and $f \in R_1$, $g \in R_0$ are missing

Chapter 2

1) page 88, prop. 2.1.2, line 6: of P^r.
2) page 101, line -4, proof of prop. 2.3.3: $(\sum_{j=1}^s c_j \,\mathrm{LC}_\sigma(g_j))te_i \in (P^r)_{te_i}$. Therefore Λ is ...
3) page 106, prop. 2.3.10, proof, line 5: $\overline{m} \in \mathrm{Syz}_P(\mathrm{LM}_\sigma(\mathcal{G})) \setminus \{0\}$,
4) page 108, tutorial 19.c: in 1), 2), 3), 4), the symbols $\subseteq$ should read $\in$
5) page 117, proof of lemma 2.4.16, line 5: $\mathrm{Syz}(\mathrm{LM}_\sigma(\mathcal{G})) = \dots$
6) page 123, example 2.5.4, line 4: $S_{12} = y^2 g_1 - x g_2 = -y^4 + xz^3 \xrightarrow{g_3} 0$
7) page 123, example 2.5.4, line 5: $x^3z^3 - xy^2z^3 \xrightarrow{g_2} 0$ should read $x^3z^3 - xy^2z^3 \xrightarrow{g_1} 0$
8) page 123, theorem 2.5.5: The formulation of the theorem and its proof can be improved by constructing a tuple $\mathcal{H}$ and using B instead of $\mathbb{B}$.
9) page 127, exercise 5.a: ... consists of binomials or monomials.
10) page 127, exercise 6.d: elements of P^3
11) page 128, tutorial 23.b: $\mathbb{Q}[x_1, x_2, x_3]$
12) page 130, tutorial 24.f: ... has (up to sign) the same reduced Gröbner basis
13) page 131, tutorial 25.e: such that $t\sigma_{ij} + t'\sigma_{jk} - t''\sigma_{ik} = 0$. Prove that one can choose $t = 1$ if and only if ...

14) page 136, theorem 2.6.6, line -5 of the proof: before "By induction" insert: Hence B is isomorphic to $A[x_1,\dots,x_{i-1},x_{i+1},\dots,x_n]/\mathfrak{n}$ for some maximal ideal $\mathfrak{n}$.
15) page 138, prop. 2.6.11, proof, line 4: Using the representation $f = q_1(x_1 - a_1) + \cdots + q_n(x_n - a_n) + p$ provided by Theorem 1.6.4, we then see that such a polynomial f belongs to $\mathfrak{m}_p$.
16) page 140, thm. 2.6.16, proof, line 5: we may assume that $\mathcal{I}(\mathcal{Z}(I)) \neq (0)$.
17) page 142, exercise 8a: Show that if I is irreducible then $\mathcal{Z}(I)$ is irreducible.

Chapter 3

1) page 149, definition 3.1.1: In the second volume, the definition is changed to $ju \le i$ in line 5.
2) page 150, prop. 3.1.4.a: $\deg_{\sigma,\mathcal{G}}(\sigma_{ij}) >_\sigma \mathrm{LT}_\sigma(\lambda(\sigma_{ij})) = \max_\sigma\{\dots\}$
3) page 151, line -8, example 3.1.7: $S_{34} = ... = ... = x_1x_3^2g_2 + x_2^2x_3^2g_1 - x_2^3g_4$
4) page 151, line -6, example 3.1.7: the last column of the matrix should be $(-x_2^2x_3^2,\ -x_1x_3^2,\ x_2x_4^2,\ -x_1^3x_3 + x_2^3)$
5) page 155, exercise 1, line 1: Show that the module ...
6) page 155, exercise 4: if and only if $s = 1$ and $g_1 \neq 0$.
7) page 155, tutorial 28, line 2: $\mathbb{R}^{k+1}$
8) page 158, tutorial 28.g.1: where $i = 1,\dots,k-1$ and $x_0 = x_k = 0$.
9) page 158, tutorial 28.g.2, line 2: $\gamma_i(x - c_{i-1}) + d_{i-1}$
10) page 159, tutorial 29.a: Show that the P-modules M and P^r/M are free.
11) page 162, lemma 3.2.2, line 2: be given by $\lambda(\varepsilon_i) = g_i$
12) page 162, prop. 3.2.3, line 2: given by $\lambda(\varepsilon_i) = g_i$
13) page 163, example 3.2.4, line 6: $v_3 = (-x_2, x_3^2, 0, 0, -x_2)$
14) page 163, example 3.2.4, line 8: $\dots, x_1x_3^2 - x_1^2,\ x_1x_2x_3)$.
15) page 170, example 3.2.21, line 1: When we apply the first part of this lemma ...
16) page 173, exercise 4: three R-submodules
17) page 173, exercise 6.b: the columns of $\mathcal{A}$ are contained in the module ...
18) page 182, prop. 3.3.9.a: The P-linear map $\Lambda_{r,s}: ...$
19) page 186, theorem 3.3.15.c: by the residue class $(a_{11}, a_{21}, \dots, a_{s1}, \dots\dots, a_{1r}, a_{2r}, \dots, a_{sr}) + U$. Then ...
20) page 194, tutorial 33.i, hint: and apply $\mathrm{Hom}_R(R/I, —)$ to the exact sequence ...
21) page 204, line -6, tutorial 35: $(p_0,\dots,p_n) \in K^{n+1} \setminus \{0\}$
22) page 205, tutorial 35.i: delete the sentence "Let $\{e_1,\dots,e_4\}$ be the canonical basis of K^4."
23) page 210, tutorial 36.m: that whenever $C(\alpha_1,\dots,\alpha_n) > C(\beta_1,\dots,\beta_n)$ ... we have the inequality $x_1^{\alpha_1}\cdots x_n^{\alpha_n} >_{\hat\sigma} x_1^{\beta_1}\cdots x_n^{\beta_n}$.

24) 216, example 3.5.10: replace $\ldots :_P (x_1)$ six times by $\ldots :_P (x_2)$
25) page 218, theorem 3.5.13, proof, line -3: we can use the lemma to get $v \in NP[y] :_{P[y]^r} (f_1 ...)^\infty$.
26) page 218, example 3.5.14: replace $I :_P (x_1)^\infty$ two times by $I :_P (x_2)^\infty$
27) page 223, tutorial 38.h: delete the hint
28) page 238, tutorial 40.f, line 5: Assume that $K[f_1, \ldots, f_s] \subset P^G$ and choose a homogeneous polynomial $g \in P^G \setminus K[f_1, \ldots, f_s]$ of minimal degree.
29) page 243, prop. 3.7.1, proof, line 4: defined by $x_i \mapsto a_i$ for
30) page 246, example 3.7.6, line 8: How sharp is this bound?
31) page 254, example 3.7.20, line -2: $z^2 - 5z = 0$
32) page 256, thm. 3.7.23, proof, line -5: ... $= (x_n - a_i)$ by construction ...
33) page 257, proof of thm. 3.7.25, line -3: $\{\mathrm{LT}_{\mathtt{Lex}}(x_1 - g_1), \ldots, \mathrm{LT}_{\mathtt{Lex}}(x_{n-1} - g_{n-1}), \mathrm{LT}_{\mathtt{Lex}}(g_n)\}$
34) page 259, line -3: $g_3 = (x_3 - 2)(x_3 + 3)(x_3^2 - x_3 - 8)$
35) page 260, example 3.7.27, line -4: $h_4 = y_3^3 + 2y_3^2 - 11y_3 - 24 = 0$
36) page 262, tutorial 42.g: $\ell(f^2)$

Appendices

1) page 306, exercise 1.3.6: Therefore $\{b_{i_1}, \ldots, b_{i_s}\}$ generates Δ.
2) page 306, exercise 1.3.9: ... $= \cup_{i=1}^r \mathbb{T}^n e_i$
3) page 308, exercise 3.6.4: for $i = 1, \ldots, s$
4) page 309, section title “Special Sets” should be smaller
5) page 309, subsection 1, line -2: projective space associated to K^{n+1}
6) page 311, last line of subsection 4: $\det(\frac{\partial f_i}{\partial x_j})$