

**ERRATA/ADDENDA: “INTRODUCTION TO ABSTRACT  
ALGEBRA,” J.D.H. SMITH**

**Lines 2 + 2 to 4:** We can also write  $y > x$  (“ $y$  greater than  $x$ ”) instead of  $x < y$ , or  $y \geq x$  (“ $y$  greater than or equal to  $x$ ”) instead of  $x \leq y$ .

**Line 20 – 10:** less than or equal to  $\sqrt{n}$ .

**Line 68 + 11:** but  $\sqrt{2} \cdot \sqrt{2} = 2$  is

**Line 72 – 8:**

$$(v_2v_1)(u_1u_2) = v_2v_1u_1u_2 = v_2eu_2 = v_2u_2 = e, \quad (4.9)$$

**Line 73 – 2:** describing

**Line 74 – 2:**  $(e_X, e_Y)$

**Line 132 + 1:** and for  $n \geq m - 1$ , define

**Line 134 – 13:** Let  $y$  be an element of a unital ring  $(R, +, \cdot)$ . Continuing to write  $u$  for the identity element of  $R$ , and considering an integer  $m$ , Corollary 6.14 yields

$$(mu)y = m(uy) = my \quad (6.12)$$

on setting  $n = 1$  and  $x = u$ . Similarly, for an element  $x$  of  $R$  and an integer  $n$ , we get

$$x(nu) = n(xu) = nx. \quad (6.13)$$

**Line 137 - 13:**

$$J = \{x \text{ in } R \mid f(x) = 0\}$$

**Line 137 – 10:** Indeed, for  $j$  in  $J$  and  $x$  in  $R$ ,

**Line 140 + 5:** *an ideal*

**Line 140 – 6:** Exercise 35

**Line 145 + 12:** with  $\theta_c(X) = c$  and  $\theta_c(r) = \theta(r)$  for  $r$  in  $R$ . If

**Line 154 – 7:** Skip (i) if the book has a 13-digit ISBN.

**Line 166 – 9:** have degree 0, and

**Line 167 – 15:**

$$S = \{\deg f(X) \mid 0 \neq f(X) \text{ in } J\}$$

**Line 171 + 5:**

$$p(-a_1^{-1}a_0) = (a_1 \cdot (-a_1^{-1}a_0) + a_0) \cdot b(-a_1^{-1}a_0) = 0,$$

**Line 171 + 9:** (An irreducible cubic.)

**Lines 182 – 1, 183 + 1:** in  $\mathbb{Z}/_2[X]/(X^3 + X + 1)\mathbb{Z}/_2[X]$ .

**Line 192 + 10:** and  $p_1 = u_1 q_1$  for some unit  $u_1$ .

**Lines 202 + 8 to + 16:** Replace the proof of Proposition 8.31 as follows:

**PROOF** If  $d_y$  does not divide  $d_x$ , the Fundamental Theorem of Arithmetic gives factorizations into powers of distinct primes

$$p_1, \dots, p_r, q_1, \dots, q_s$$

of the form

$$d_x = p_1^{e_1} \dots p_r^{e_r} q_1^{f_1} \dots q_s^{f_s} \text{ and } d_y = p_1^{g_1} \dots p_r^{g_r} q_1^{h_1} \dots q_s^{h_s}$$

with  $e_i \geq g_i \geq 0$  for  $1 \leq i \leq r$  and  $h_j > f_j \geq 0$  for  $1 \leq j \leq s$ . Set

$$k = q_1^{f_1} \dots q_s^{f_s}, \quad x^k = u \text{ and } l = p_1^{g_1} \dots p_r^{g_r}, \quad y^l = v,$$

so  $d_u = p_1^{e_1} \dots p_r^{e_r}$  and  $d_v = q_1^{h_1} \dots q_s^{h_s}$ . Since  $\gcd(d_u, d_v) = 1$ , the Chinese Remainder Theorem yields the contradiction  $d_{uv} = d_u d_v = p_1^{e_1} \dots p_r^{e_r} q_1^{h_1} \dots q_s^{h_s} > d_x$ .  $\square$

**Line 206 – 8, – 7:** Let  $D$  be an integral domain. Show that Condition (a) below is necessary for (b):