

## Chapter 1

# An Example Chapter

In this chapter we demonstrate the features of the preamble.tex file. Section 1.1 covers the use of the example environment and what mathematics looks like, while Section 1.2 shows the Algorithm environment and a quotation.

### 1.1 Example environment and mathematics layout

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#### ▼ Example 1.1.1

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Let  $f = yx - x^2 + x$  and  $g = 2y + x + 1 \in \mathbb{Q}[x, y]$ . We use degree lexicographic order with  $y > x$ . Dividing  $f$  by  $g$  gives us:

$$2y + x + 1 \overline{) \begin{array}{r} yx - x^2 + x \\ 2y^2x - yx^2 + 3yx \end{array}}$$

In reduction notation this division looks as follows:

$$f \xrightarrow{g} -2yx^2 + 2yx \xrightarrow{g} 2yx + x^3 + x^2 \xrightarrow{g} x^3 - x.$$

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Math numbers are set 0123456789, normal numbers are set 0123456789.

## 1.2 Algorithm and a quotation

### Algorithm 1.2.1 – *Multivariate Division Algorithm*

**Input:**  $f, f_1, \dots, f_t \in \mathbb{F}[x_1, \dots, x_n]$  with  $f_i \neq 0$  ( $1 \leq i \leq t$ ).

**Output:**  $u_1, \dots, u_t, r \in \mathbb{F}[x_1, \dots, x_n]$  such that  $f = u_1 f_1 + \dots + u_t f_t + r$ ,  $r$  is reduced with respect to  $\{f_1, \dots, f_t\}$  and  $\text{lp}(f) = \max(\text{lp}(f_i), \text{lp}(u_i), \text{lp}(r))$ .

**Initialisation:**  $u_i := 0, r := 0, h = f$ .

**While**  $h \neq 0$  **Do**

**Loop**

“ Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, ‘and what is the use of a book,’ thought Alice ‘without pictures or conversation?’