Errata in *Discrete Mathematics and Functional Programming*

Pg 26: Ex 1.6.9 refers to a distance of $18\frac{1}{2}$ without giving units. Assume inches. Thanks to Cana Baez

Pg 48: Exercise 1.11.2 says that the function should return `~1` in the case that the input is zero, but that conflicts with the `real` return type. Instead, return `~1.0`. Thanks to David Topham.

Excercise 1.11.5 mentions replacing `Chips` with `Fries`. However, the datatype given in Section 1.10 (available from `https://cs.wheaton.edu/~tvandrun/dmfp/sec1-10-own-types.sml`) doesn't have `Fries`. Either add `Fries` to the datatype or make this function something like `replaceCarrotSticks`. Thanks to Kyler Dunn.

$4! = 4 \cdot 3 \cdot 2 \cdot \cdot 1$ should be $4! = 4 \cdot 3 \cdot 2 \cdot 1$. Thanks to Cooper Lazar.

Pg 50: I don't believe there is a way to solve Exercise 1.12.1 using what the student knows at that point and without using ML's `size`. The best solution would be to turn the string into a list using explode and then use the solution to Exercise 2.2.4. The following would work:

```
fun charCount("") = 0
   | charCount(s) = 1 + charCount(substring(s, 1, size(s) - 1));
```

...but that's silly, since if we are allowed to use size anyway, there is no reason to write `charCount`.

Pg 51: Exercise 1.12.5 should tell you to assume input values are nonnegative. Thanks to Hezekiah Valdez.

Pg 100: Exercises 3.2.3 reads $\sim T \vee F \wedge T \vee T$. This is not an error, but it is inconsistent, since in other examples and exercises I tend to parenthesize expressions fully. Many students miss the brief mention of precedence rules for $\vee$ and $\wedge$ on pg 98. Read this exercise as $(\sim T \vee (F \wedge F)) \vee T$.

Pg 105: The example in the middle of the page should be $\sim (\sim p \wedge q) \vee (p \wedge \sim p) \equiv p \vee \sim q$. Note the p on the right is not negated. This affects the original statement of the problem ("Suppose we were to show that $\sim (\sim p \wedge q) \vee (p \wedge \sim p) \equiv p \vee \sim q$") and the first three right hand sides of the "Don't do this" column. Spotted by Caleb Josue Ruiz Torres. (Moreover, the $=$ in the "Do this" column should all be $\equiv$. Spotted by David Topham.)

Do this:

$$
\begin{array}{lll}
\multicolumn{2}{l}{\sim (\sim p \wedge q) \vee (p \wedge \sim p)} & \\
\equiv & \sim (\sim p \wedge q) \vee F & \text{by negation law} \\
\equiv & \sim (\sim p \wedge q) & \text{by identity law} \\
\equiv & p \vee \sim q & \text{by De Morgan's}
\end{array}
$$

Don't do this:

$$
\begin{array}{rcll}
\sim (\sim p \wedge q) \vee (p \wedge \sim p) & \equiv & p \vee \sim q & \\
\sim (\sim p \wedge q) \vee F & \equiv & p \vee \sim q & \text{by negation law} \\
\sim (\sim p \wedge q) & \equiv & p \vee \sim q & \text{by identity law} \\
p \vee \sim q & \equiv & p \vee \sim q & \text{by De Morgan's}
\end{array}
$$

Pg 121: "Clearly $u \wedge p \rightarrow q \vee r \ldots$" should be "Clearly $u \wedge p \rightarrow q \wedge r \ldots$"

Pg 135: "…has additive" should be "has additive inverse."

Pg 136 The premise "If Socrates is a human, then he is mortal" doesn't match the form $\forall\ x \in A, P(x)$. Instead it should read "All humans are mortal." (But then it doesn't match the argument from Section 3.11…Oh well.)

Pg 138: In the *first* example, step vii should cite iii and vi, not iii and iv. In the *second* example, step xi should cite iii (and x and d), not iv.

Pg 139: Ex 3.14.7 premise a should have "for all y in B, $P(x, y)$" parenthesized, that is:

$$\text{(a) } \forall\ x \in A, (\forall\ y \in B, P(x, y)) \rightarrow Q(x)$$

Pg 167: *"D and E together make a partition of the powerset of A, $\mathscr{P}(A)$."* should be *"$\mathscr{P}(D)$ and E together make a partition of the powerset of A, $\mathscr{P}(A)$."*

Pg 177: In Exercise 4.10.6, the "termination" condition in Lemma 4.22 is incorrect. It should read:

> **Lemma 4.22** *For all $a, b \in \mathbb{N}$, there exists unique $n, r \in \mathbb{W}$ such that $a = b^n + r$ and $0 \leq r < (b-1) \cdot b^n$.*

Pg 179: Statement lists are introduced in section 1.3, not section 2.5.

Pg 205: Exercise 5.3.4 should say "requires that $\mathcal{I}_R(a) = \emptyset$", that is, element a rather than set A. Thanks to Janet Davis.

Pg 208. The intention for Ex 5.4.1 was reflexivity fails for zero. However, the definition of reflexivity does allow $0|0$ even though division by zero is undefined, Thanks to Janet Davis.

Pg 222: Ex 5.7.4 should read $(S \circ R) \circ Q = S \circ (R \circ Q)$.

Pg 260: In Ex 6.2.14, see Section 1.7 (not 2.5) to review the `string` type.

Pg 335: Ex 7.3.9 should read, "For example, `filter(fn(x) => x mod 2 = 0`…"

Pg 359: In Ex 3.9.3, the fifth bullet (which is the first bullet of the second column of exercises, top right corner) should read

- Either $f(a) \in F(A - \{a\})$ or $f(a) \notin F(A - \{a\})$.

Pg 450: The part of the figure in the top right corner should read "Then add edge (1, 4)…", not "Then add edge (3, 4)".

Pg 513: The first bullet under the chapter goals should read "terms about lattices," not "terms about graphs."

Pg 653: The first paragraph under A.1 says that the general forms and set forms were introduced in Chapter 1. They were introduced rather in Chapter 4.

Pg 658: Under "Proving transitivity," the second step should be "Show that a is related to c. *Hence* $(a, c) \in R$ *by* …"