Problems

Find the missing bits in these binary addition and subtraction sums:

(1)

			1
+		1	*
	1	*	*

(2)

		1	1
+	1	*	*
	1	*	*

(3)

		1	0	*
+		1	*	1
	1	*	1	0

(4)

		1	*	1
+		1	1	*
	1	0	*	*

(5)

		1	1	*
+	1	*	*	*
	1	*	*	0

(6)

	1	1	*
-		1	*
		1	*

(7)

	1	*	*
-	1	*	*
		1	1

(8)

	1	*	1	*
-		1	*	*
			1	*

(9)

	1	*	1	*
-			1	*
		1	*	*

(10)

	1	*	1	*
-		1	0	*
		1	0	*

(11) Express the following fractions as bicimals; (a) $\frac{1}{5}$, (b) $\frac{3}{7}$.

(12) You wish to send the message 0110 1110 010 to a friend. Calculate the check digits x_1, x_2, x_4 and x_8 and the complete message that you will transmit. Suppose that there is at most one error in transmission and that your friend receives 1001 1100 1100 010. Show how your friend could identify where the error occurred.

(13) Use your calculator to find $\sqrt{3}$ to at least 14 decimal places.

(14) Devise a suitable set of weights if you may put them on both pans of a pair of scales.

(15) Explore what happens if you enter a number in your calculator, press one of the operation keys $+, -, \times, \div$ twice, then enter a second number followed by repeatedly pressing the $=$ key.