**Quantum Computer Science: An Introduction Errata**

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Errata as of January 12, 2012

p 8. Last sentence of second paragraph. $x$ should be $X$. [2/27/09]

p 19. First sentence of first paragraph after Equation (1.67). $(2^n)!$ should be $2^n$ [9/18/08]

p 21. Caption of Fig. 1.2, 2nd line. "ares" should be "are". [9/12/08]

p 25. Last line of figure caption. $|x_n\rangle$ should be $|x\rangle_n$.

p 29. Second line from bottom. $x$ should be $|x\rangle_n$. [2/27/09]

p 30. Sixth line of figure caption. $n$ should be $n+1$. [2/27/09]

p 30. Equation (1.80). Above the summation sign $2^m$ should be $2^m - 1$. [9/18/08] [This corrects an incorrect erratum posted on 9/12/08!]

p 34. Second line after Equation (1.92). Reference to (1.91) should be to (1.92). [2/27/09]

p 34. First line after Equation (1.93). "general 1-Qbit state" should be "general 2-Qbit state". [9/12/08]

p 38. Third line from bottom: "ouput" should be "output".

p 39. Equation (2.8). In both of the two equations separated by "and", the right parenthesis (just to the left of the = sign) should be the same size as the left parenthesis (just to the right of the $\mathbf{U}$). [9/12/08]

p 45. Last three lines of last paragraph. Instead of "the input register ends up in the state $|0\rangle$ if $f(0) = f(1)$ and in the state $|1\rangle$ if $f(0) \neq f(1)$" it should say "if both registers start in the state $|1\rangle$ then the input register ends up in the state $|1\rangle$ if $f(0) = f(1)$ and in the state $|0\rangle$ if $f(0) \neq f(1)$" [9/12/08]

p 48. 7th line of text from bottom. $\Psi$ should be $\psi$. [9/12/08]

p 52. Equation (2.32). The product should run from $j = 0$ to $n - 1$. [9/18/08]

$$\prod_{j=0}^{n-1}$$

p 54. 4th line from end of first paragraph: "2 Qbit SWAP gates" should be "2 Cbit SWAP gates". [9/12/08]

p 58. In the second paragraph of Section 2.6 both times the word "Qbit" appears it should be "Cbit". [9/12/08]

p 58. First line before Equation (2.41). Remove the ) after "Qbits".

p 59. Equation (2.45). This should be exactly the same as Equation (B.4) on p 168:

$$(\overrightarrow{a} \cdot \overrightarrow{\boldsymbol{\sigma}})(\overrightarrow{b} \cdot \overrightarrow{\boldsymbol{\sigma}}) = (\overrightarrow{a} \cdot \overrightarrow{b})\mathbf{1} + i(\overrightarrow{a} \times \overrightarrow{b}) \cdot \overrightarrow{\boldsymbol{\sigma}} \tag{2.45}$$

[9/12/08]

p 59. Third line from bottom. **a**, **b**, and **n** should be $\overrightarrow{a}$, $\overrightarrow{b}$, and $\overrightarrow{n}$. [9/12/08]

p 59. Second line from bottom. $\mathbf{u}(\mathbf{n}, \theta)$ should be $\mathbf{u}(\overrightarrow{n}, \theta)$ [9/12/08]

p 61. Caption of Fig. 2.13, third line from bottom. "Controlled-U" should be "Controlled-$U$".

p 63. 8th line from bottom. $n^{1/3}$ should be $n/2$. [10/19/08]

p 68. Change last sentence ("But this is an inefficient way to proceed, even classically.") with "This is known to be the most efficient way to proceed on a classical computer. As in the analysis of Simon's problem, on p. 55, it takes a time that grows with the number $n$ of Qbits as $2^{n/2}$."

p 69. Two sentences on lines 5-11 after table. Replace these two sentences with the single sentence "To have an appreciable probability of finding $r$ with a classical computer requires a number of evaluations of $f$ that is exponential in $n_0$. [2/27/09]

p 75. Parenthetical remark at the end of the paragraph after Equation(3.41). Replace the text "and one additional Qbit, initially in the state $|0\rangle$ — an instructive exercise to think about —" with "since permutations can be built out of pairwise interchanges and SWAP gates can be constructed as in Eq. (1.23)," [9/12/08]

p 81. 4th line from bottom: remove the word "essentially" [9/12/08]

p 83. Third line from top. $b$ on the left should be 1. [9/12/08]

p 92, second line of Equation (4.11) on extreme right. $|\,\rangle a$ should be $|\,a\rangle$ [9/12/08]

p 98, second line from bottom. "Toffoli" should be "cNOT" [9/12/08]

p 116. Equation (5.25). $|\Psi\rangle$ is missing on the extreme right. [9/12/08]

p 122, 2nd line after Equation (5.47). "the the" should be "the". [9/12/08]

p 131, 3rd line of caption of Fig. 5.13. "extreme left" should be "extreme right". [9/12/08]

p 139, next to last paragraph, 3rd line from end. "horizontally" should be "vertically", "vertically" should be "horizontally". [9/12/08]

p 152, Fig. 6.5. The two cNOT gates in part (a) are in the wrong order. They should be in the same order as they are in part (b). [9/12/08]

p 152. Add to the caption of Fig. 65 "Here $|\phi\rangle = \mathbf{H}|\,0\rangle$." [9/12/08]

5. Equation (6.30). The expression $(|000\rangle - |111\rangle)$ in the third line should be preceded by $\frac{1}{\sqrt{2}}$. [9/12/08]

p 164. 4th line from top. After "unique" insert ", up to multiplicative factors of modulus 1,".

p 164. First sentence in second paragraph. $\mathbf{A}_1 = \mathbf{B} + \mathbf{B}^\dagger$ and $\mathbf{A}_2 = i\big(\mathbf{B}^\dagger - \mathbf{B}\big)$ should be $\mathbf{A}_1 = \frac{1}{2}\big(\mathbf{B} + \mathbf{B}^\dagger\big)$ and $\mathbf{A}_2 = \frac{i}{2}\big(\mathbf{B}^\dagger - \mathbf{B}\big)$ [9/18/08]

p 166. Extreme left of Equation (A.38). $|\mathbf{A}\rangle$ should be $\mathbf{A}$. [9/12/08]

p 199, second to last line of footnote. Change "1,2,2,1,1,7,35" to "1,2,2,1,7,35". [9/12/08]

p 201, Eq. (L.7) should be $b^{r-(p-1)(q-1)/2} = 1 \pmod{pq}$.