System Reliability Theory
Models, Statistical Methods, and Applications
(3rd edition)

Errata

Marvin Rausand Anne Barros

Version 1.0

This note lists misprints and minor errors found in the third edition of *System Reliability Theory* (Wiley, 2020). All users of the book are encouraged to help us reveal misprints/errors and to report these to Anne Barros.

Important misprints/errors that may lead you astray, will be indicated by a page number in red color.

Misprints/errors that need a substantial explanation will be indicated here, and treated in detail in the *supplement* report.

- Page 284: Error revealed by Professor Jørn Vatn, NTNU.

  There are several errors on this page. The table at the top of the page is wrong! Because A and B are connected to M by an AND-gate, the event M occurs only when both A and B occur (i.e., = 1) at the same time. The correct truth table is therefore:

A	B	M
0	0	0
0	1	0
1	0	0
1	1	1

  1. Let us first derive the correct result for the BN / fault tree in Figure 4.38 by ordinary fault tree logic.

Recall that $T = 1$ means that the TOP event occurs, whereas $T = 0$ means that the TOP event does not occur. The same applies for the other events A, B, C, and M.

Events A and B are connected to M by an AND-gate, such that

$$\Pr(M = 1) = \Pr[(A = 1) \cap (B = 1)] = \Pr(A = 1)\Pr(B = 1) = q_a q_b$$

Events M and T are connected to T by an OR-gate, such that

$$\begin{aligned} Q_0 &= \Pr(T = 1) = \Pr[(M = 1) \cup (C = 1)] \\ &= \Pr(M = 1) + \Pr(C = 1) - \Pr[(M = 1) \cap (C = 1)] \end{aligned}$$

Because the events are independent, we obtain

$$\begin{aligned} Q_0 &= \Pr(M = 1) + \Pr(C = 1) + \Pr(M = 1)\Pr(C = 1) \\ &= q_M + q_c - q_M q_c = 1 - (1 - q_M)(1 - q_c) \\ &= 1 - (1 - q_a q_b)(1 - q_c) \end{aligned}$$

which corresponds to the «upper bound approximation» formula.

2. Now, we use the BN approach and start by establishing the truth table for this BN. We obtain – because the events M and C are connected to T by an OR-gate, which means that T occurs when at least one of M and C occur:

M	C	T
0	0	0
0	1	1
1	0	1
1	1	1

From the truth table, observe that $\{T = 0\} \Leftrightarrow \{M = 0 \cap C = 0\}$, such that

$$\begin{aligned} Q_0 &= 1 - \Pr(T = 0) = 1 - \Pr(M = 0 \cap C = 0) = 1 - \Pr(M = 0)\Pr(C = 0) \\ &= 1 - (1 - q_M)(1 - q_c) = 1 - (1 - q_a q_b)(1 - q_c) \end{aligned}$$

which is the same result we obtained with the fault tree approach.

Instead of using the intermediate event M, we might as well have set up a truth table for all the events A, B, C and T, but this would imply slightly more work.

Sorry! I (MR) must have been «sleeping» while writing this page.