

Problem 1

(1) How many events?

6 edges $\rightarrow 2^6 = 64$ events E_i (refer to the table 6.1 in the next pages)

$$(2) R_{ab} = \sum_{\text{good events}} P(\text{good events})$$

$$= P(E_1) + P(E_2) + P(E_3) + \dots + P(E_7) + \sum_{i=8}^{22} P(E_i)$$

$$+ \sum_{i=23}^{34} P(E_i) + \sum_{i=37}^{47} P(E_i) + P(E_{50}) + P(E_{56}) + P(E_{58})$$

$$= p^6 + 6q p^5 + 15q^2 p^4 + 18q^3 p^3 + 7q^4 p^2 + q^5 p$$

For $q=0.1$ $p=0.9$

$$R_{ab} = 0.997848$$

TABLE 6.1 The Event-Space for the Graph of Fig. 6.1 ($s = a, t = b$)

No failures:	$\binom{6}{0} = \frac{6!}{0!6!} = 1$
$E_1 = 123456$	Good
One failure:	$\binom{6}{1} = \frac{6!}{1!5!} = 6$
$E_2 = 1'23456$	Good
$E_3 = 12'3456$	Good
$E_4 = 123'456$	Good
$E_5 = 1234'56$	Good
$E_6 = 12345'6$	Good
$E_7 = 123456'$	Good
Two failures:	$\binom{6}{2} = \frac{6!}{2!4!} = 15$
$E_8 = 1'2'3456$	Good
$E_9 = 1'23'456$	Good
$E_{10} = 1'234'56$	Good
$E_{11} = 1'2345'6$	Good
$E_{12} = 1'23456'$	Good
$E_{13} = 12'3'456$	Good
$E_{14} = 12'34'56$	Good
$E_{15} = 12'345'6$	Good
$E_{16} = 12'3456'$	Good
$E_{17} = 123'4'56$	Good
$E_{18} = 123'45'6$	Good
$E_{19} = 123'456'$	Good
$E_{20} = 1234'5'6$	Good
$E_{21} = 1234'56'$	Good
$E_{22} = 12345'6'$	Good
Continued . . .	
Three failures:	$\binom{6}{3} = \frac{6!}{3!3!} = 20$
$E_{23} = 1234'5'6'$	Good
$E_{24} = 123'45'6'$	Good
$E_{25} = 123'4'56'$	Good
$E_{26} = 123'4'5'6$	Good
$E_{27} = 12'345'6'$	Good
$E_{28} = 12'34'56'$	Good
$E_{29} = 12'34'5'6$	Good
$E_{30} = 12'3'456'$	Good
$E_{31} = 12'3'45'6$	Good
$E_{32} = 12'3'4'56$	Good

TABLE 6.1 (Continued)

$E_{33} = 1'2345'6'$	Good
$E_{34} = 1'234'56'$	Good
$E_{35} = 1'234'5'6'$	Bad
$E_{36} = 1'2'3456'$	Bad
$E_{37} = 1'2'345'6'$	Good
$E_{38} = 1'2'34'56'$	Good
$E_{39} = 1'23'456'$	Good
$E_{40} = 1'23'45'6'$	Good
$E_{41} = 1'23'4'56'$	Good
$E_{42} = 1'2'3'456'$	Good

Four failures: $\binom{6}{4} = \frac{6!}{4!2!} = 15$

$E_{43} = 123'4'5'6'$	Good
$E_{44} = 12'34'5'6'$	Good
$E_{45} = 12'3'45'6'$	Good
$E_{46} = 12'3'4'56'$	Good
$E_{47} = 12'3'4'5'6'$	Good
$E_{48} = 1'234'5'6'$	Bad
$E_{49} = 1'23'45'6'$	Bad
$E_{50} = 1'23'4'56'$	Good
$E_{51} = 1'23'4'5'6'$	Bad
$E_{52} = 1'2'345'6'$	Bad
$E_{53} = 1'2'34'56'$	Bad
$E_{54} = 1'2'34'5'6'$	Bad
$E_{55} = 1'2'3'456'$	Bad
$E_{56} = 1'2'3'45'6'$	Good
$E_{57} = 1'2'3'4'56'$	Bad

Continued . . .

Five failures: $\binom{6}{5} = \frac{6!}{5!1!} = 6$

$E_{58} = 12'3'4'5'6'$	Good
$E_{59} = 1'23'4'5'6'$	Bad
$E_{60} = 1'2'34'5'6'$	Bad
$E_{61} = 1'2'3'45'6'$	Bad
$E_{62} = 1'2'3'4'56'$	Bad
$E_{63} = 1'2'3'4'5'6'$	Bad

Six failures: $\binom{6}{6} = \frac{6!}{6!0!} = 1$

$E_{64} = 1'2'3'4'5'6'$	Bad
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