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CPSC 424 Computer Networks II Homework #3

1. A. Possibilities of connection: connected nodes: 3, 2, 2, 0 (3 = fully connected)

probability = $(1-p) * 1/4$
$= 1/4 - 1/4p$
$= -1/4p + 1/4$

B. Possibilities of connection: connected nodes: 3, 3, 3, 3, 2, 2, 2, 0 (3,3,3,3 = fully connected; 2,2,2,0 = failure)

probability = $(1-p) * 4/8$
$= (1-p) * 1/2$
$= 1/2 - 1/2p$
$= -1/2p + 1/2$

2. A. 00000, 01101, 10110, 11011

B. 01101 ⊕ 10110 = 11011; 10110 ⊕ 11011 = 01101 (mhd)
Minimum hamming distance is 3

C. Max number of detectable reliably bit errors = mhd − 1 = 3 − 1 = 2

D. Max number of corrected reliably bit errors = $\lfloor mhd/2 \rfloor = \lfloor 3/2 \rfloor = 1$

3. Mean time to failure is average of failure times → (30 + 60)/2 = 45 days / MTTF

4. A. idle = $1 - p * n$ B. oneRequest = p^n

C. multipleRequests = $(n-1) * p$

D. oneRequest = $0.05^4 = 0.00000625$

5. Interrupts have priorities to make it easier to handle multiple interrupts especially unmaskable interrupts (like unrecoverable errors). The unmaskable interrupts need to have the higher priority to protect system resources.

6. Average Memory Access Time = Hit Time + Miss Rate × Miss Penalty

= 1 + 0.75 × 100

= 1 + 75

= 76 ms