The probabilities that the external force Q acts in locations M and N are 0.8 and 0.2, respectively, If Q acts at M, the probabilities of failure due to bending and shear are 0.002 and 0.0002, respectively. If Q acts at N, the probabilities of failure due to bending and shear failures are 0.004 and 0.0003, respectively. Determine (1) the probability of bending failures, (2) the probability of shear failures.

Solution
    (1) From the total probability theorem, the probability of failure due to bending is
        $P(B) = 0.0024$
    (2) The probability of failure due to shear is
        $P(S) = 0.00022$