2. A gear has two failure modes of excessive bending (A) and surface wear (B). If $P(A)=0.001$, $P(B)=0.002$, and $P(A|B)=0.05$, what is the probability of failure?

Solution

Let C = failure of the gear

$$C = A \cup B$$

$$P(C) = P(A) + P(B) - P(AB)$$
$$= P(A) + P(B) - P(A|B)P(B)$$
$$= 0.001 + 0.02 - 0.05(0.002) = 0.0029$$