①

a) RHS = $(P(A) - P(A,B)) + (1 - P(A) - 1)$

$= P(A, B^c) - P(A) + P(A, B^c) = LHS$

∴ (a) is false

b) $LHS = P(A) = 1 - P(A^c) = 1 - (P(A^c, B) + P(A^c, B^c)) = RHS$

∴ (b) is true

c) $LHS = P(A^c \cup B^c) = 1 - P(A \cap B) = 1 - [P(A) + P(B)] + P(A \cup B)$

$\leq 2 \cdot 1 - (P(A) + P(B)) = RHS$

∴ (c) is true

② Given: positive = P, infective = I, negative = N.

$P(P, I) = 0.95$

$P(N, I^c) = 0.99$

$P(I) = 0.001$

a) $P(I) = 0.001$

Should not be concerned.

b) $risk = P(P, I^c) \cdot P(I^c) + P(N, I) \cdot P(I)$

$= .05 \times 0.999 + .01 \times 0.001$

$= 0.04996$

c) $risk = P(N, I) \cdot P(I) = 0.0001$

d) Yes.