Problem

Given a Base Rate, Sensitivity, and Specificity, find the constituent cell proportions within a 2 x 2 table such that any other relevant 2 x 2 table statistic may be so computed from them.

Also, you can change the base rate whilst keeping Sensitivity and Specificity fixed, and then determine say PPP and NPP for any base rate.

Given:

$BR := 0.4 \qquad SENS := 0.5 \qquad SPEC := 0.8333333$

Set $T := 1.0$

Then Compute:

$InvBR := 1 - BR$

$ac := T \cdot BR \qquad ac = 0.4$

$bd := T \cdot InvBR \qquad bd = 0.6$

$A := ac \cdot SENS$

$C := T \cdot BR - A$

$D := bd \cdot SPEC$

$B := T - (A + D + C)$

which yields the 2 x 2 classification matrix where
A = True Positive
B = False Positive
C = False Negative
D = True Negative

$A = 0.2$	$B = 0.1$
$C = 0.2$	$D = 0.5$

$$PPP := \frac{A}{A + B} \qquad PPP = 0.667$$

$$NPP := \frac{D}{C + D} \qquad NPP = 0.714$$

Paul Barrett, 13th May, 2003