Lightness L^*_Z for surround mean grey Z (sRGB)

For separated surface colours in the range $0{,}0036<R<0{,}90$

or the digital range $1/255=0{,}0039<R<1{,}00$ it is valid:

$L^*_Z = a\,(R/R_n)^k$ **[1]** **a=100; R_n=1,00; k=0,42=1/2,4**

$= b\,(R/R_u)^k$ **[2]** **$b=a(R_u/R_n)^k$=50; R_u=0,18**

For $R=R_u$ it is valid: $L^*_{Zu}=50$.

Derivation of equation [2] gives with $1-k = 0{,}58$:

$\delta(L^*_Z)/\delta R = c\,(R/R_u)^{1-k}$ **[3]** $c = (b\,k)/R_u = 21/18 = 1{,}17$

or for the threshold $\delta(L^*_Z)=1$

$\delta R = d\,(R/R_u)^{1-k}$ **[4]** $d = R_u/(b\,k) = 18/21 = 0{,}86$

For the surround lightness $L^*_{Zu} = 50$ with $R=R_u$ the threshold is:

$\delta R_{Zu} = 0{,}86$. This threshold is *independent* of k.