Using R

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The point of this exercise is to become more familiar with R and find the limiting value of D_b. Create a table of five rows that has b and D_b associated with it. Use any of the R functions you need. What is the limit of $\lim D_{b\,n\to\infty}$? To remind gentle readers, $\phi'(x) = \frac{d\phi(x)}{dx}$.

Theorem Let $g(b, n)$ be the number of alignments of two sequences of length n where matches must occur in blocks of length at least $b \geq 1$.
Define

$$\phi(x) = (1-x)^2 - 4x(x^b - x + 1)^2$$

and let ρ be the smallest positive root of $\phi(x) = 0$. Then

$g(b, n) \approx (\gamma_b n^{-1/2}) D_b^n, n \to \infty$

where $D_b = \rho^{-1}$ and $\gamma_b = (\rho^b - \rho + 1)(\pi\rho\phi'(\rho))^{-1/2}$