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 $\lim_{n \to \infty} D_{bn}$? 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 $\rho$ be the smallest positive root of $\phi(x) = 0$. Then

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

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