(19.7) A large homogeneous thermal reactor contains only ^{235}U dispersed in beryllium in the atomic ratio 1:3*10^4. The migration area is 0.023 m^2. Assuming $p = \varepsilon = 1$, calculate the size of a cylindrical reactor with height equal to diameter.

$M2 := 0.023 \cdot m^2$ Migration area given in text above

$Sigma_{fuel} := 582.2 + 98.6$ From Table 19.2 for thermal neutrons

$Sigma_{mod} := 3 \cdot 10^4 \cdot 0.009$ From Table 19.3 and atomic ratio given in text

$f := \frac{Sigma_{fuel}}{Sigma_{fuel} + Sigma_{mod}}$ $f = 0.716$ Eqn. (19.13)

$\eta := 2.068$ $\varepsilon := 1$ $p := 1$ From Table 19.2 and data given in text

$k_{inf} := \eta \cdot \varepsilon \cdot p \cdot f$ $k_{inf} = 1.481$ Eqn. (19.12)

$B2 := \frac{\left(k_{inf} - 1\right)}{M2}$ $B2 = 20.902 \cdot m^{-2}$ From right part of eqn. (19.19)

$B2 = 33 \cdot b^{-2}$ Eqn. (19.21c) gives: $b := \sqrt{\frac{33}{B2}}$ $b = 1.257 \cdot m$