

Solutions to One Equation One Unknown Problems

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Ratio Here are some common ratios.

Unif Draw Min and Max Ratio We want to draw numbers such that we have some mean b , and that the possible maximum and minimum value drawn are at most a times apart. Given b and a , solve for x .

$$f(x) = \frac{b+x}{b-x} - a = 0$$

$$b \cdot a - x \cdot a = b + x \quad b \cdot a - b = x + x \cdot a \quad b(a-1) = x(a+1) \quad x = \frac{b(a-1)}{a+1}$$

Uniformly draw

```
b <- 100
a <- 2
x <- (b*(a-1))/(a+1)
ar_unif_draws <- runif(100, min=b-x, max=b+x)
fl_max_min_ratio <- max(ar_unif_draws)/min(ar_unif_draws)
cat('fl_max_min_ratio =', fl_max_min_ratio, 'is close to a =', a, '\n')

## fl_max_min_ratio = 1.965882 is close to a = 2
```