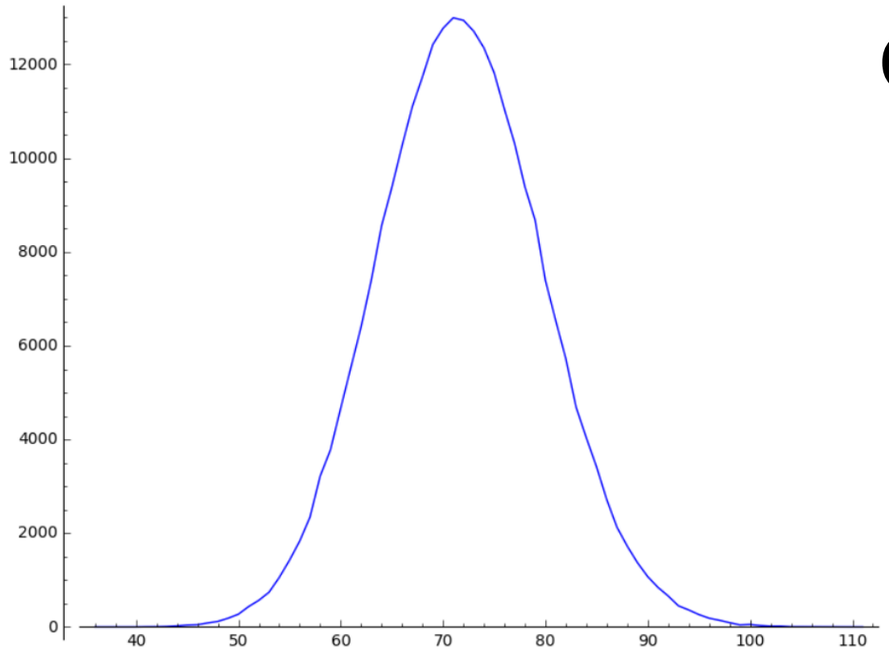
# A conjecture about the distribution of distance-to-β-normal-form for linear lambda terms




CLA 2020 open problem session

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with Alexandros Singh and Olivier Bodini

Let $d_\beta(t)$ = min { length of β-reduction sequence $t \to^* v$ }

Easy fact: for a linear term, $d_\beta(t) = (|t| - |nf(t)|)/3$.

Example: $d_\beta(B\ B) = 2$ since

(\a.\b.\c.a(b(c)))(\a.\b.\c.a(b(c)))  |t| = 17

→ \b.\c.(\a.\b.\c.a(b(c)))(b(c))

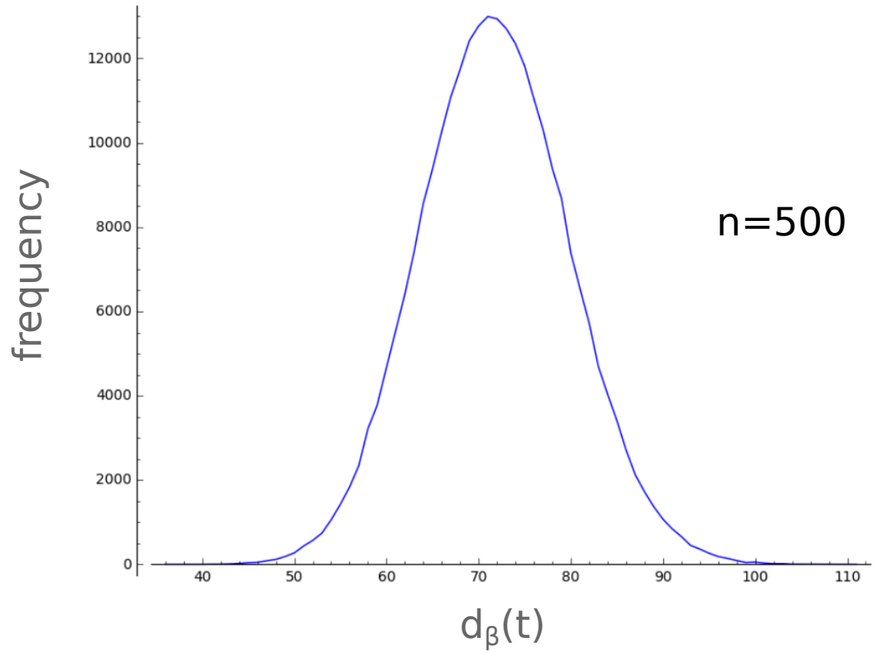
→ \b.\c.\d.\e.(b(c))(d(e))  |nf(t)| = 11

Conjecture: $d_\beta(t)$ is asymptotically normal with $\mu \sim n/7$

and $\sigma^2 \sim ?$

for closed linear terms t of size $|t| = 3n+2$.

Evidence: experimental*




*using the LinLam library (https://github.com/noamz/linlam)