用 Big Step 证 termination

Week 11 Q2

Base case: a=0

⇒ mul 0 b ⇒0

GD $\dfrac{\text{mul} = \text{fun} \ldots}{\text{mul} \Rightarrow \text{fun} \ldots}$

App $\dfrac{\text{mul} \Rightarrow \text{fun} \quad 0 \Rightarrow 0 \quad b \Rightarrow b \quad \text{match } 0 \text{ with } 0 \Rightarrow \ldots}{\text{mul } 0 \ b}$

PM $\dfrac{0 \Rightarrow 0 \quad 0 \Rightarrow 0}{\text{match } 0 \text{ with } 0 \Rightarrow \ldots}$ （化简前 化简后）

Inductive Steps:

I.H. mul a b terminates for $a \geq 0$.
we show it also terminates for a+1

by I.H.

$\dfrac{b \Rightarrow b \quad \ldots \Rightarrow 0 \ \ldots}{\text{PM}\ \dfrac{a+1 \Rightarrow a+1 \quad \square \Rightarrow (a+1) \neq b}{\text{match } \ldots \rightarrow \square \Rightarrow \ldots}}$

$\dfrac{\text{mul} \quad (a+1) \Rightarrow a+1 \quad b \Rightarrow b}{\text{mul } (a+1) \ b \Rightarrow (a+1) \neq b}$

Week 12 Ex 3

Base case $l = []$

$$\frac{\Pi_{threesum}\ [] \Rightarrow [] \quad \text{match } [] \text{ with } [] \to 0 \ \cdots \Rightarrow \cdots}{\text{three sum } [] \Rightarrow 0}\ P_M\ \frac{[] \Rightarrow [] \quad 0 \Rightarrow 0}{\cdots}$$

$$\Pi_{threesum} = \frac{threesum = A \ \cdots \Rightarrow \cdots A}{three\ sum \Rightarrow fun\ A}$$

Inductive Steps

I.H. for l threesum l terminates

We proves for $x :: l$ it also terminates

为了便于表达数字：

for $l = [x_1; x_2; \cdots; x_n]$ it terminates,

for $x_{n+1} :: l$ it also ter...

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theorem $x_{n+1} : L \Rightarrow \sum_{i=0}^{n+1} x_i$