Izpit   18.6.2019

haloga   1b:

b) (6 točk) Definiramo λ-izraze

$$a := \lambda f x . f(f(f(fx))), \qquad b := \lambda g y . g(g(y)).$$

$\lambda f x . f'(fx)$

Kateremu izrazu je enak izraz $a\,b\,c\,d$?

(i) $c(c(c(c(c(c(c(c(c\,d)))))))))$

(ii) $c(c(c(c(c(c(c(c(c\,d))))))))))$

(iii) $c(c(c(c(c(c(c\,d)))))))$

(iv) $\lambda x . c\,d(c\,d(c\,d(c\,d(c\,d(c\,d(c\,d(c\,d\,x)))))))$

$a \quad b \quad c \quad d$

$((a\,b)\,c)\,d$

$(\lambda x . e)\, d \rightarrow$

$e[x := d]$

$(a\,b)\,c\,d$

$a\,b = \left(\lambda f x . f(f(f(f\,x)))\right) b =$

$\lambda x . b(b(b(b\,x)))$

$a\,b\,c = \qquad b(b(b(b\,c)))$

$b(b(b((\lambda g\,y.g(g\,y))\,c)))$

$b(b(b(\lambda y.c(c\,y))))$

$b(b((\lambda g x.g(g x))\,(\lambda y.c(c\,y))))$

$\lambda x.c(c(c(c\,x)))$

8

16 ?

$a\,b\,c\,d = (\lambda f x. f(f(f(f\,x))))\, b\,c\,d$

$= (\lambda x. b(b(b(b\,x)))\,c\,d$

$b(b(b(b\,c)))\,d$

$(\lambda g x.g(g x))\,(b(b(b\,c)))\,d$

$(\lambda x. (\quad)((\quad)x))\,d$

$(\quad)(\quad)\,d$

$(b(b(b\,c)))\,(b(b(b\,c)))\,d$

NAPAKA
V IZPITU ?!!?

KAJ SE
TO PRAVI

d) (6 točk) V λ-računu evaluiramo izraz

$$(\lambda fx.\, f(fx))(\lambda f.\, ff)(\lambda x.\, x)$$

Kateri izraz dobimo?

✓ (a) $\lambda z.\, z$ $= \lambda y.\, y$

(b) $\lambda f.\, ff$

(c) $\lambda x.\, x(xx)$

(d) izraza ne moremo evaluirati

$$(\lambda f\, x.\, f\,(f\,x))\,(\lambda g.\, g\,g)\,(\lambda y.\, y)$$

$$(\lambda x.\,(\lambda g.\, g g)\,((\lambda g.\, g g)\,x))\,(\lambda y.\, y)$$

$$(\lambda x.\,(\lambda h.\, h h)\,(x\, x))\,(\lambda y.\, y)$$

$$(\lambda x.\,(x\, x)(x\, x))\,(\lambda y.\, y)$$

$$((\lambda y.y)(\lambda y.y))\,\underbrace{((\lambda y.y)(\lambda y.y))}_{\sigma}$$

$$\underbrace{(\lambda y.y)}\quad \underbrace{(\lambda y.y)}$$

$$\lambda y.\, y \qquad \lambda z.\, z$$

$$(\lambda y.y)\,\sigma = \sigma$$
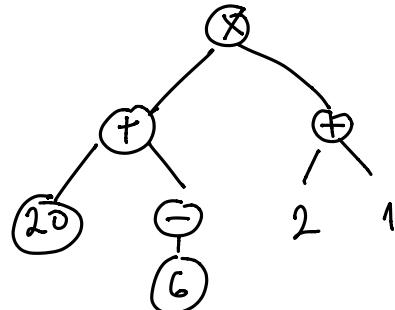
$\langle$rilka$\rangle$ | $\langle$izraz$\rangle \ominus$ | $\langle$izraz$\rangle \langle$izraz$\rangle \oplus$ | $\langle$izraz$\rangle \langle$iz...

$+$

... nasprotno vrednost, seštevanje in množenje. Na ...

$$20\ 6 \ominus \oplus 2\ 1 \oplus \otimes$$

...ntaktično drevo, ki predstavlja zgornji izraz.

```
[(fn (x, y) => (y, x)), (fn (a, b) => (42, b))]
```
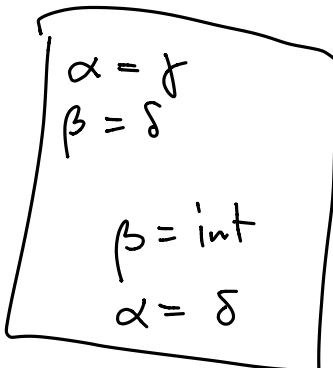
$$\alpha \times \beta \to \beta \times \alpha \qquad \gamma \times \delta \to \text{int} \times \delta$$

$$\left\lceil \quad \alpha \times \beta \to \underline{\beta \times \alpha} \;=\; \gamma \times \delta \to \underline{\text{int} \times \delta} \right.$$

$$\left\lfloor \quad \alpha \times \beta = \gamma \times \delta \right.$$

$$\boxed{\begin{array}{l} \alpha = \gamma \\ \beta = \delta \\[4pt] \beta = \text{int} \\ \alpha = \delta \end{array}} \qquad \alpha = \gamma = \delta = \beta = \text{int}$$

$$\beta \times \alpha = \text{int} \times \delta$$