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Com S 342
Homework 6.

1.
  a. ((λ(x)x)((λ(y)y)(((λ(v)(λ(w)w))a)b))) <b is the answer,notebook>
     ((λ(x)x)((λ(y)y)(((λ(w)w))b)))
     ((λ(x)x)((λ(y)y)((λ(b)b))))
     ((λ(x)x)((λ(y)y)b))
     ((λ(x)x)b)
     (λ(b)b)
     (b)

  b.(((λ(x)(λ(y)(x y)))((λ(w)w)a))b) <(a b) is the answer, check notebook>
    (((λ(x)(λ(y)(x y)))((λ(a)a)a))b)
    ((λ(x)(λ(y)(x y))a)b)
    ((λ(a)(λ(y)(x y))a)b)
    ((λ(b)(a y))b)
    (a b)

  c.(((λ(x)(λ(y)(y y)))(λ(a)a))b) <(b b) is the answer, check notebook >
    ((λ(x)(λ(y)(y y))a)b)
    ((λ(a)(λ(y)(y y))a)b)
    (λ(y)(y y))b)
    (λ(b)(y y))b)
    (b b)

2. i.
   ((λ(x)p)((λ(y)(y y))(λ(z)(z z)))) <p is the answer>
   ((λ(x)p){((λ(z)(z z))(λ(z)(z z)))}
   The portion, with {} are inputs to X which would be input for lambda x.
   thus you are left with..
   ((λ(x)p))
    (p)

    ii. Infinite loop
    ((λ(x)p)((λ(y)(y y))(λ(z)(z z)))) <p is the answer>
    ((λ(x)p)((λ(z)(z z))(λ(z)(z z))))
    (λ(x)p)((λ(y)(y y))(λ(z)(z z)))
    ((λ(x)p)((λ(z)(z z))(λ(z)(z z)))
    ... and so on..

3. Define the logic Boolean operations of or a b using true,false and ite given in the lecture.
    (((ite a)true)b)

4.
  a.((λ(z)((three f)z))two)
    (f(f(f two)))
    The func will apply f on (two) 3 times.

  b.
      i. (g zero)
    ((λ(n)((third)true))zero)
    ((zero third) true)
    (((λ(f)(λ(x)x))third)true)
    ((λ(x)x)true)
    True

ii. (g one)
((λ(n)((third)true))one)
((one third) true)
(((λ(f)(λ(x)fx)))third)true)
(((λ(x)(third x))true)
(third true)
((λ(f)(λ(y)(λ(z)z z)))true)
  (λ(y)(λ(z)z))
false

iii. (g two)
((λ(n)((n third)true))two)
((two third) true)
(((λ(f)(λ(x)f(fx)))third)true)
(((λ(x)(third third x))true)
(third (third true))
(third (λ(x)(λ(y)(λ(z) z) true)
(third(λ(y)(λ(z) z))
(third false)
((λ(f)(λ(y)(λ(z) z)))false)
(λ(y)(λ(z)z))
false

iv. What mathematical/logical operations is computed by g?
  (= n zero)

5.

a. What is the result of (g zero)?
((λ(n)((n(λ(x) false))true))zero)
((zero(λ(x)fasle))true)
((λ(f)(λ(x)x))(λ(n)false))true)
((λ(x((λ(x)false)x)true))
((λ(x)x)true)
  true

b. What is the result of (g one)?
((λ(n)((n(λ(x) false))true)one))
((one(λ(x)fasle))true)
((λ(f)(λ(x)fasle))true)
((λ(x((λ(x)false)x)true))
((λ(x)false)true)
    false

c. What computations does g preforms
     returns true for zero and false for any other values.

d. (define equal)(
    (lambda(x y)
    (let x (g(sub(x y)))
  (((ite x)true)(false)
))))