**COMP-301 PS-7**

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**Problem-1:**

**a-)**

**let x= 23**

**in proc(y)**

**let z= -(y,x)**

**let t= -(x,y)**

**in –(y,t)**

**The contour diagram of the above program is the following:**

**(let ( ( x 23) )**

scope of x= 23

**(proc(y)**

scope of proc(y)

**(let ((z (- y x)))**

**(let ((t (- x y)))**

scope of z = (- y x)

**(- y t) ) ) ) )**

scope of t = (- x y)

**b-)**

let z=5 in

letrec f(x) = if zero?(x) then 1

else (f -(x, 1))

in (f 5)  
Draw the environment that is passed to value-of when the expression «f» in «(f -(x, 1))» is evaluated for x=3.

«(f -(x, 1))» when x= 3, «(f -(3, 1))»= «(f(2))» is evaluated at last in the environment which is supposed to be drawn.

The environment passed to the value-of when the given «(f -(x, 1))» expression is evaluated at x= 3 is as follows: <<if zero?(x) 1 f(-(x,1))>> ρ0 [x0= [5] , x1= [4], x2= [3]] (extend-env-rec f(x) <<if zero?(x) 1

f(-(x,1))>> ρ0)

Flow in the LETREC code given:

z= 5

f(5)= if zero?(5) then 1 else (f(4)) for x= 5, evaluation done.

f(4)= if zero?(4) then 1 else (f(3)) for x= 4, evaluation done.

f(3)= if zero?(3) then 1 else (f(2)) for x= 3, evaluation done.

f(2)= if zero?(2) then 1 else (f(1)) for x= 2, evaluation done. (The equality x=2 indicates the end.)

f(1)= if zero?(1) then 1 else (f(0))

f(0)= if zero?(0) then 1 else (f(-1)) (Since zero?(0) is true, we return 1 here)