CSE 3302/5307 Programming Language Concepts

Homework8 - Fall 2023

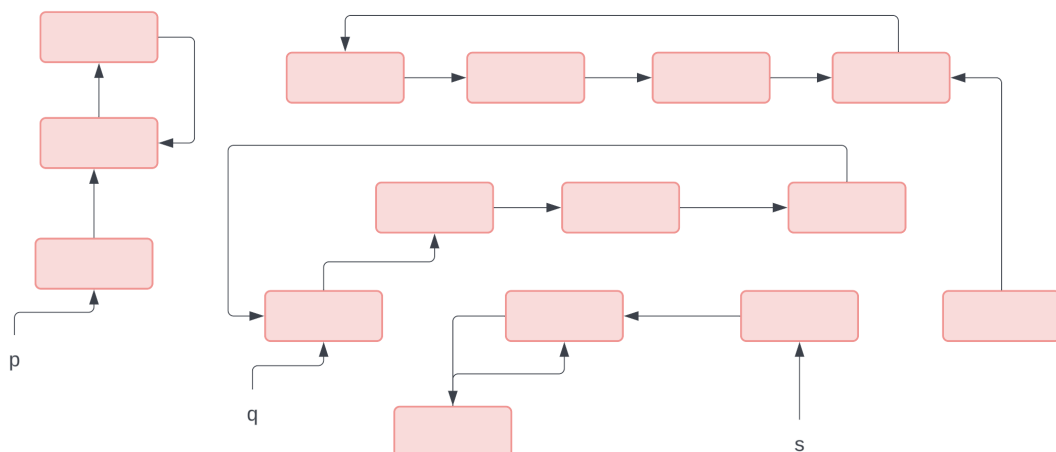## Due Date: Oct. 21st, 2024, 11:59p.m. Central Time

Problem1 - 60%

Figure 1: Heap Configuration

Consider the heap configuration shown for allocated memory words. The heap is in total 100B in this case and one memory word is 4B.

a) Compute the amount of memory leaked for this configuration

b) Mark the nodes that will be added to the free_list after reference counting

c) Compute the amount of memory leaked after each of reference counting and mark and sweep

d) How does mark and sweep detect the cycle although it is not in the reference graph?

e) Compute the memory overhead from each of reference counting and mark and sweep. Assume that each count needed by RC takes 1 byte.

f) Mention a set of conditions under which reference counting could be viewed to be significantly better than mark and sweep

Problem2 - 10%

In Cheney's algorithm, the memory words in the from_space are mapped in a consistent and contiguous sense to the to_space. If that's the case, why is it necessary to store the forward addresses while mapping? Consider illustrating your explanation with a diagram.

Problem3 - 30%

Prove the preservation theorem as covered in the lecture (Untyped Lambda Calculus II). For each case where the proof proceeds, mention the need to prove and inductive hypotheses in if-then statements.

Name: _____ UTA ID: _____