CS558 Programming Languages – Fall 2023 – Suggested Study Question Solutions for Lecture 4b

1. Here are the stack data contents.

(i) a = 2, b = 20

(ii) a = 2, b = 20, r = 3, q = 3

(iii) a = 2, b = 20, r = 3, q = 3, s = 3, t = 10, p = 6

(iv) a = 2, b = 20, r = 3, q = 7

(v) a = 2, b = 8

2.(a) Under call-by-value, `twiddle` has no effect on `p0` or `p1`, so the first two outputs are "`0 1`"; `swizzle` actually exchanges the contents of the `a` fields, so the second two outputs are "`1 0`".

(b) Under call-by-reference, `twiddle` actually exchanges the values of `p0` and `p1`, so the first two outputs are "`1 0`"; `swizzle` exchanges things as before, so the second two outputs are "`0 1`".

(c) Assuming un-boxed semantics, the parameters to `twiddle` and `swizzle` are copied when they are passed, creating new objects, and similarly for the assignment to `z` in `twiddle`. This has no effect on the visible behavior of `twiddle`, so the first two outputs are again "`0 1`". But `swizzle` now operates on local copies of its arguments, so it has no effect on the variables in `main`, and the second two outputs are also "`0 1`".