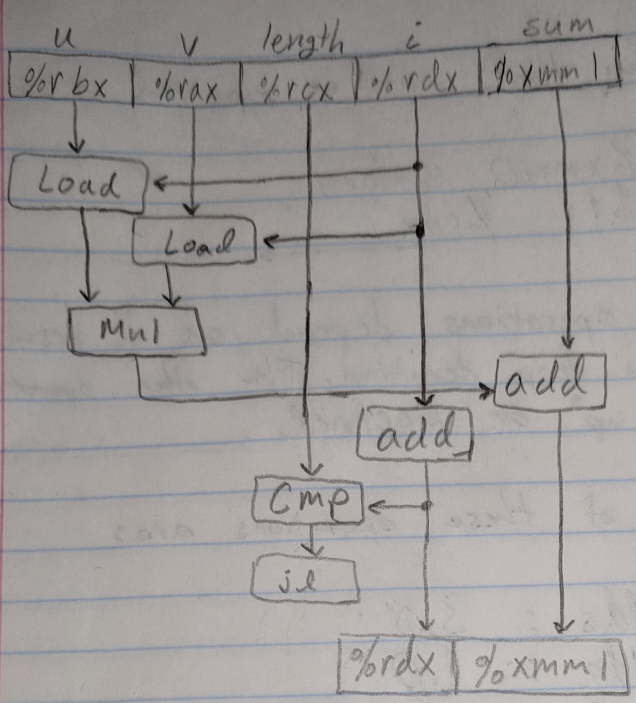
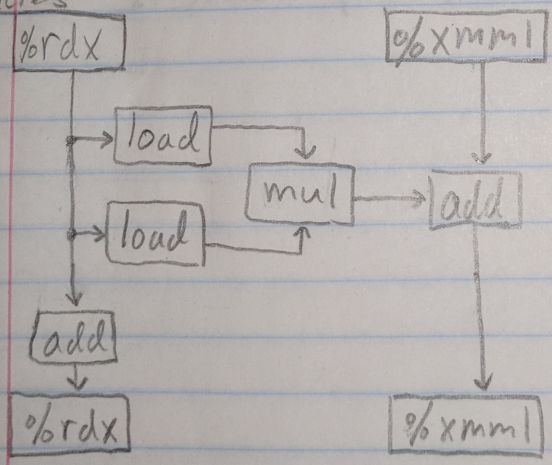
2a)

Data-Flow



Data Dependencies



2b) The instructions that can't be pipelined are:

```
addss %xmm0, %xmm1
addq $1, %rdx
```

because these operations depend on a result from a previous loop iteration. The other operations can be 'queued up' or pipelined.

The latencies of these operations are:

addss : 3.0
addq : 1.0

therefore the lower latency bound is 3.0 CPE.

2d.

After testing the execution time of inner versus inner2 with varying array lengths, I found that inner2 is approximately twice as fast as inner. I expected it to be faster due to the fact that inner2 was optimized with 4-way loop unrolling. Therefore inner2 is more efficient.