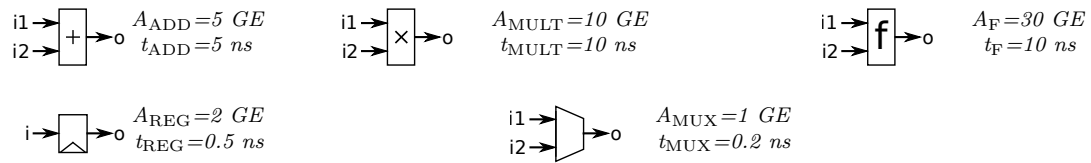


Essentials of Computer Systems - Exercises #3

1 Datapath Design - part 2

Exercise 1.1 Datapath design:

- (a) Design a datapath (draw a DFD) with the following functionality: $z = d \cdot f(2a, f(2a, b + c))$. The building blocks available are an adder, multiplier, and a functional unit f , shown figure below. design goals: maximize T_{put} while minimizing the clock period and the area. All inputs are available only in the first clock cycle.

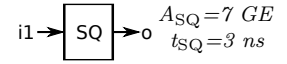
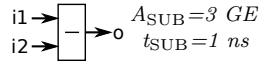
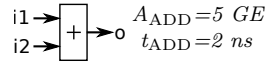


- (b) Fill out the analysis table for the DFD obtained in part (a):

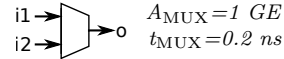
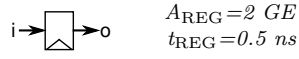
Analysis table	
latency	
throughput	
critical path delay	
clock period	
# inputs	
# outputs	
# registers	
# multiplexers	
# adders	
# multipliers	
# f units	
total area in GE	

Exercise 1.2 *Datapath design:*

- (a) Design a datapath (draw a DFD) with the following functionality: $z = a^2 - b + (a - c)^2 + c$. The building blocks available are an adder, subtracter, and a squarer, shown figure below. Design goals: maximize T_{put} while minimizing the area. All inputs are available only in the first clock cycle.



ORDER: i1=x, i2=y and o=x-y



- (b) Fill out the analysis table for the DFD obtained in part (a):

Analysis table	
latency	
throughput	
critical path delay	
clock period	
# inputs	
# outputs	
# registers	
# multiplexers	
# adders	
# subtracters	
# squarers	
total area in GE	

- (c) Draw the circuit for the DFD obtained in part (a):