Unit 13 - Week 11

Assignment 11

The due date for submitting this assignment has passed. **Due on 2019-10-16, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Which of the following types of code optimizations forms an essential part of the CORDIC algorithm? *1 point*

- Software pipelining
- Dead code elimination
- Strength reduction
- Common subexpression elimination

No, the answer is incorrect.
Score: 0
Feedback:
Solution: While the other optimizations may also be applicable in certain cases, the core idea of replacing multiplication by shift-add is strength reduction.
Accepted Answers:
Strength reduction

2) $x_{i+1} = x_i - d_i y_i 2^{-i}$
$y_{i+1} = y_i + d_i x_i 2^{-i}$
$z_{i+1} = z_i - d_i \alpha_i$ *1 point*

In rotation mode, $CORDIC$ is used to take an input x, y and convert it to x', y' that has been rotated by an angle $\theta = z_0$. What should be the choice of d_i in the equations for the iteration to converge such that $x_n = x', y_n = y'$?

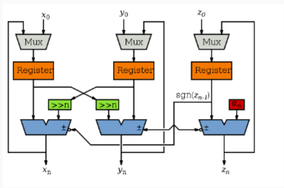
- $sgn(x_i)$
- $sgn(z_i)$
- $sgn(y_i)$
- $-sgn(x_i y_i)$

No, the answer is incorrect.
Score: 0
Feedback:
Solution: If we initialize $z_0 = \theta$, then this choice of d_i will allow the equation to converge.
Accepted Answers:
$sgn(z_i)$

3) In vectoring mode, $CORDIC$ is used to take an input x, y and find the angle $z_n = tan^{-1}(y/x)$. What should be the choice of d_i in the equations for the iteration to converge? *1 point*

- $sgn(x_i)$
- $sgn(z_i)$
- $sgn(y_i)$
- $-sgn(x_i y_i)$

No, the answer is incorrect.
Score: 0
Feedback:
Solution: This choice will try to make y_i go to 0, and angle will accumulate in z_i
Accepted Answers:
$-sgn(x_i y_i)$



4) In the implementation of $CORDIC$ shown, the critical path will be determined by what type of operation? *1 point*

- Shift
- Division
- Addition
- Multiplication

No, the answer is incorrect.
Score: 0
Feedback:
Solution: Shift does not require circuitry with delay, and only addition is required for CORDIC.
Accepted Answers:
Addition

5) CORDIC cannot be implemented as a combinational circuit *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Feedback:
Solution: By using loop unrolling, CORDIC can be implemented in a combinational manner.
Accepted Answers:
False

6) Which of the following connection types are preferable for systolic arrays? *1 point*

- Short data wires
- Global routing wires
- Broadcast connections
- High fanout connections

No, the answer is incorrect.
Score: 0
Feedback:
Solution: Short wires are more regular and easy to route
Accepted Answers:
Short data wires

7) Systolic arrays are best suited for applications that require: *1 point*

- High throughput
- Low latency
- High latency
- Low area

No, the answer is incorrect.
Score: 0
Feedback:
Solution: Apart from throughput, other metrics are not well suited for systolic arrays.
Accepted Answers:
High throughput

8) Systolic arrays are well suited for control intensive applications *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Feedback:
Solution: Control intensive implies conditional statements, which are not regular in nature
Accepted Answers:
False

9) Projection is used to map an N-dimensional dependence graph to a $N/2$-dimensional processor graph *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Feedback:
Solution: It is mapped to an N-1 dim processor graph and 1-dim of time
Accepted Answers:
False

10) Only multiplication and addition operations can be used in systolic arrays *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Feedback:
Solution: There is no restriction on the type of operations that can be used.
Accepted Answers:
False