**Chapter 1 Notes**

**Question 1:**

**Diagram

Description automatically generated**

For diagrams, circle within a circle is an accept state.

State with line from nowhere is start state

Transitions are lines

Reject states are single line circles

**Question 2:**

**It should accept the state, as it ends on q2**

Language of first diagraph (shown in class)

A = {*w* | *w* contains at least one 1 and an even number of 0s following the last 1 }

Formal Definition of finite automaton:

It is a 5-tuple (Q, Sigma, delta, q0, F)

Q: finite set called set of states

Sigma: Finite set called alphabet

Delta: Q x Sigma -> Q is the transition function

q0: included in Q that is the start state called initial state

F: Subset of Q, set of accept states, also called the ﬁnal states

**Question 3:**

**Q: q1 q2 q­3**

**Sigma: 0, 1**

**Delta: q­1: q1 q2**

**q2: q2 q3**

**q3:q2**

**q0: q1**

**F: q2**

**Question 4:**

**Q: q1 q2**

**Sigma: 0, 1**

**Delta: q­1: q1 q2**

**q2: q1 q2**

**q0: q1**

**F: q2**

**Question 5:**

**Q: q0 q1 q2**

**Sigma: {0, 1, 2, *reset*}**

**Delta: Said not to do it**

**q0: q0**

**F: q0**

Sometimes the machine states are too big, so we can give a formal description instead

Q = where

Σ =

δ = (next slide)

=

F =

**Question 6:**

**Graphical user interface

Description automatically generated**

With the above, you can change the logic to be an even number of 1s by switching the accept state.

**Question 7:**

Diagram

Description automatically generated

Objects are our languages, and the tools for language manipulation are Union, Concatenation, and Star

**Question 8:**

**AuB = {good, bad, boy, girl}**

**A o B = {good, boy} {good, girl} {bad, boy} {bad, girl}**

**A\* = { empty, good, bad, good good, bad bad, good bad, bad good, bad bad, good good good, good good bad, …}**

Much like math operators will output a number, these will output language if language is inputted.

**Question 9:** Diagram

Description automatically generated**A picture containing graphical user interface

Description automatically generatedDiagram

Description automatically generated**