Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ uname: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Honor code:**

I have not given or received aid on this quiz, nor have I observed anyone else doing so:

Sign here:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This quiz is graded out of 100 points and is worth about 4% of your class grade. You will have *25 minutes* for this quiz. ***Closed everything including calculators!*** To receive partial credit, work must be shown.

1. Transistor to truth table **[30 points, -5 per wrong or blank entry, minimum 0]**

B

C

A

A

C

B

OUT

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **B** | **C** | **OUT** |
| 0 | 0 | 0 |  |
| 0 | 0 | 1 |  |
| 0 | 1 | 0 |  |
| 0 | 1 | 1 |  |
| 1 | 0 | 0 |  |
| 1 | 0 | 1 |  |
| 1 | 1 | 0 |  |
| 1 | 1 | 1 |  |

Fill in the above truth table with either “1”, “0”, “Hi-Z” or “Smoke” (the last if OUT is connected to both Vcc and Ground).

1. Reduce the number of states in the state transition diagram as much as possible using the partitioning method. Show your work and draw the reduced state diagram. **[50 points]**

X

X

X

X’

X’

X

X’

X’

X

X

X’

X’

|  |  |
| --- | --- |
| **A** |  |
| **B** |  |  |  | | |
| **C** |  |  |  |  | |
| **D** |  |  |  |  |  |
| **E** |  |  |  |  |  |
|  | **F** | **A** | **B** | **C** | **D** |

1. Design a circuit which implements the following state transition diagram. You are to assume that the flip-flop(s) are reset to 0 (so the initial state should be all zeros). **[20 points]**

X/Y=1

X’/Y=0

X/Y=0

X’/Y=0