Quiz 3 – EECS 270, Spring '23

Name: _____Key_____ unique name: _____Key_____

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 3% of your class grade. You will have **20** minutes for this quiz. ***Closed everything including calculators!*** To receive partial credit, work must be shown.

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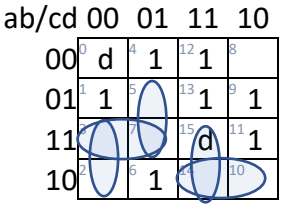
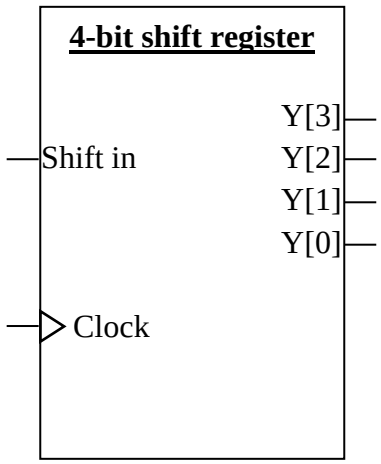
1. Find the minimum ***product-of-sums*** $\Sigma_{(a,b,c,d)}=(1,4,6,9,11,12,13)+d(0,15)$ using a K-map. Show your work and clearly circle your answer. **[40]**
   Note: this is Product-of-sums!!!



And the four corners. That gives !Function=!b!d+!a!bc+!abd+(abc or ac!d).
So (b+d)*[(a+b+!c) or [(a+!c+!d)]*(a+!b+!d)*[(!a+!b+!c) or (!a+!c+d)]

2. Using a single shift register (given below), a decoder (any size), inverters (as many as needed), and up to four 2-input gates of any type, build a device which takes a single-bit input X and has an output Y go high if the last 3 values have been 001 or the last two values have been 11. On this shift register, on the rising edge Y[0] gets the Shift in value, Y[1] gets the Y[0] valute, etc.



There are a couple of ways to do this.

- You could use a decoder with Y[2:0] as inputs and "OR" together decoder outputs 1, 3, and 7 (using 2 OR gates).
- Another way is to AND Y1 and Y0, use 2 AND gates to get !Y2*!Y1*Y0 and then OR those together. (4 gates total).