Record your SOP design process from above electronically. You should have all of your work on one page. If you printed the page with your design steps and manually wrote in your steps, you can either scan the page or take a photo of the page and save as a JPG. If you created the design electronically, take a screen shot of your design steps and save in JPG format. **This image satisfies the requirements for deliverable #1.**

4.2.5.2 Implement a 3-Input Prime Number Detector using a Minimized SOP Form

Breadboard your Minimized SOP Circuit for the Prime Number Detector

You are now going to breadboard your minimized SOP circuit. You will drive in the 3-bit input codes using your LED driver circuit. You will display your detector's final output on the "F" LED of the driver circuit.

Test your Minimized SOP Prime Number Detector Circuit

Provide power to your breadboard using the power supply from the Analog Discovery configured to output +3.4v. Take a short video (<5 s) showing the proper operation of your minimized SOP prime number detector. You should cycle through each of the 8 possible input codes and show that the F LED only asserts for prime numbers. **This video satisfies the requirements for deliverable #2.**

4.2.5.3 Design a 3-Input Prime Number Detector using a Minimized POS Form

You are now going to design a circuit that will implement the 3-input prime number detector, but this time using a minimized POS approach. You will derive the minimized POS logic expression using a K-map. The steps in this design process are as follows:

- Create a 3-input truth table with the desired output for each input code.
- Use a K-map to drive a minimized POS logic expression.
- Draw the logic diagram of the POS logic expression.
- Map the logic operations into the available ICs in your parts kit.

Create the Truth Table

In the space provided below, draw the truth table for the 3-input prime number detector. This is the same table as above, it is just being redrawn here so it is readily available.

DEC	ABC	Output
0	000	0
1	001	0
2	010	1
3	011	1
4	100	0
5	101	1
6	110	0
7	111	1

Derive the Minimized POS Logic Expression using a K-map

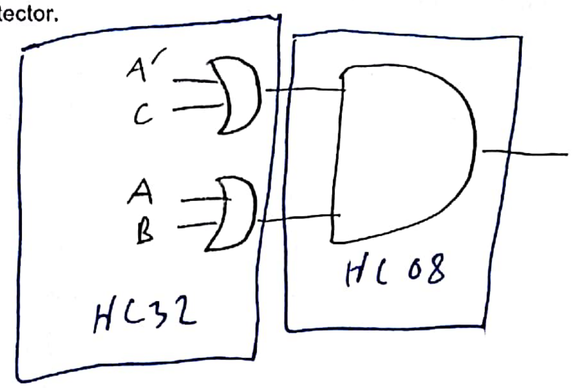
In the space provided below, derive the minimized POS logic expression using a K-map for the 3-input prime number detector.

C \ A,B	00	01	11	10
0	0	1	0	0
1	0	1	1	1

$(C+A')(A+B)$

Draw the Logic Diagram for the Minimized POS Logic Expression

In the space provided below, draw the logic diagram for the minimized POS logic expression for the 3-input prime number detector.



Map the Logic Diagram for your POS Circuit into Available ICs in your Parts Kit

In the above logic diagram, draw rectangles around the logic operations that can be implemented within a single logic IC from your parts kit. Write the part number next to the rectangle.

Record your POS design process from above electronically. You should have all of your work on one page. If you printed the page with your design steps and manually wrote in your steps, you can either scan the page or take a photo of the page and save as a JPG. If you created the design electronically, take a screen shot of your design steps and save in JPG format. **This image satisfies the requirements for deliverable #3.**

4.2.5.4 Implement a 3-Input Prime Number Detector using a Minimized POS Form

Breadboard your Minimized POS Circuit for the Prime Number Detector

You are now going to breadboard your minimized POS circuit. You will drive in the 3-bit input codes using your LED driver circuit. You will display your detector's final output on the "F" LED of the driver circuit.

Test your Minimized POS Prime Number Detector Circuit

Take a short video (<5 s) showing the proper operation of your minimized POS prime number detector. You should cycle through each of the 8 possible input codes and show that the F LED only asserts for prime numbers. **This video satisfies the requirements for deliverable #4.**

4.2.5.5 A Buzzer Driving Circuit

Breadboard an Interfacing Circuit for a Magnetic Buzzer

There are often times when a digital circuit needs to interface with a device that requires more current than a logic gate output can provide. One example of this is a magnetic buzzer. The buzzer in your parts kit will make sound when V_{CC} is provided across its terminals; however, it will also draw 35 mA when it is on. This is above what our 74HC logic family can provide. In order to interface our logic signals to the buzzer, we will use the circuit in Figure 4.4.