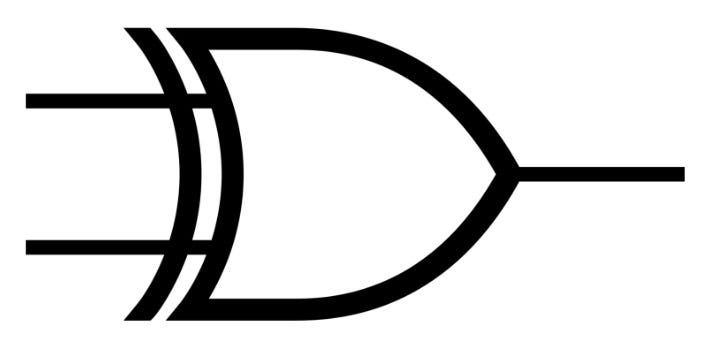
1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cin | 0 | 1 | 1 | 0 |
| MSB 1 | 1 | 0 | 1 | 0 |
| MSB 2 | 1 | 0 | 1 | 0 |
| Output | 0 | 1 | 1 | 0 |
| Cout | 1 | 0 | 1 | 0 |
| Overflow | Yes | Yes | No | No |





There are two cases when overflow occurs (i.e., denoted in red above), both when Cin and Cout are opposites. Hence why the XOR circuit, with Cin and Cout is a good candidate for overflow detection. In other words, overflow really only happens when Cin and Cout are not the same.

2.