

**Encoders**

**Part A** Complete the following truth table for a priority encoder.

$IN_3$	$IN_2$	$IN_1$	$IN_0$	$OUT_1$	$OUT_0$	$Valid$
1	0	0	0			
X	1	0	0			
X	X	1	0			
X	X	X	1			
0	0	0	0			

**Part B** Implement the following priority encoder using only basic gates.

$IN_3$	$IN_2$	$IN_1$	$IN_0$	$OUT_1$	$OUT_0$	$Valid$
0	0	0	0	X	X	0
0	0	0	1	0	0	1
0	0	1	X	0	1	1
0	1	X	X	1	0	1
1	X	X	X	1	1	1

**Part C** The following truth table describes the behavior of an encoder with an unusual priority. Based on the don't cares of the inputs, list the inputs from the highest priority to lowest.

$IN_3$	$IN_2$	$IN_1$	$IN_0$	$OUT_1$	$OUT_0$	$Valid$
0	0	0	0	X	X	0
X	0	X	1	0	0	1
0	0	1	0	0	1	1
X	1	X	X	1	0	1
1	0	X	0	1	1	1

---

highest

---

2nd highest

---

3rd highest

---

lowest

**Part D** Implement the output  $OUT_1$  for this priority encoder using basic gates.