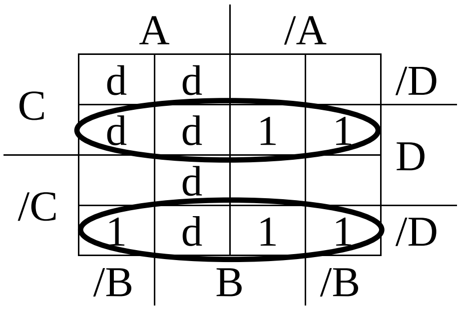
Karnaugh Maps With Don't Cares - Answers

There will be times when you don't care about the output from a circuit for certain combinations of inputs. Take the following example. It is part of a circuit that will light up one of the digits on a calculator display. This means that the only inputs that are of interest to the designer are those that represent the denary digits 0 to 9. So we could draw the the truth table as follows:

A	B	C	D	X	
0	0	0	0	1	/A./B./C./D
0	0	0	1	0	
0	0	1	0	0	
0	0	1	1	1	/A./B.C.D
0	1	0	0	1	/A.B./C./D
0	1	0	1	0	
0	1	1	0	0	
0	1	1	1	1	/A.B.C.D
1	0	0	0	1	A./B./C./D
1	0	0	1	0	
1	0	1	0	d	A./B.C./D
1	0	1	1	d	A./B.C.D
1	1	0	0	d	A.B./C./D
1	1	0	1	d	A.B./C.D
1	1	1	0	d	A.B.C./D
1	1	1	1	d	A.B.C.D



The idea is that you plot the d's on the map as well as the ones. When you are looking for groups, you can include them in a box if it makes the box bigger (and the corresponding term therefore simpler), or you can leave them out of a box if that makes the resulting term simpler.

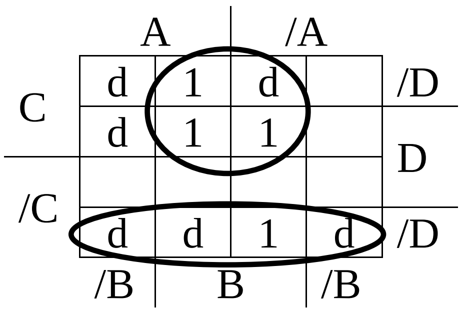
So for the map above, you could end up with the following expression:

`Z =  C.D + /C./D`

Exercise

Write a simplified expression for the truth table shown below:

A	B	C	D	X	
0	0	0	0	d	/A./B./C./D
0	0	0	1	0	
0	0	1	0	0	
0	0	1	1	0	
0	1	0	0	1	/A.B./C./D
0	1	0	1	0	
0	1	1	0	d	/A.B.C./D
0	1	1	1	1	/A.B.C.D
1	0	0	0	d	A./B./C./D
1	0	0	1	0	
1	0	1	0	d	A./B.C./D
1	0	1	1	d	A./B.C.D
1	1	0	0	d	A.B./C./D
1	1	0	1	0	
1	1	1	0	1	A.B.C./D
1	1	1	1	1	A.B.C.D



`X = B.C + /C./D`