

1. a) First the kernel is flipped to perform convolution

-1	0	1
-2	0	2
-1	0	1

 \Rightarrow

1	0	-1
2	0	-2
1	0	-1

Next I add zero padding to the image to handle boundary conditions

1	0	2	3	1
3	2	0	7	0
0	6	1	1	4

 \Rightarrow

0	0	0	0	0	0	0
0	1	0	2	3	1	0
0	3	2	0	7	0	0
0	0	6	1	1	4	0
0	0	0	0	0	0	0

Finally I perform the convolution to get

-2	1	-11	2	13
-10	4	-8	-2	18
-14	1	5	-6	9