3.1

(a) $\begin{bmatrix} -2 & 3 & -1 \\ -2 & 3 & -1 \\ -2 & 3 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} -2 & 1 & 1 \\ -2 & 1 & 1 \\ -2 & 1 & 1 \end{bmatrix}$

3.2

definition of same padding: pad 0 to make the output dimension remains the same as the input dimension. Therefore, no matter what kernel size we choose, since the output dimension remains unchanged, the number of application will also remain unchanged.

3.3

When the kernel size is 1×1, the output dimension will be the same as the input dimension.

3.4

(a) the dimension is: $5 \times 5 \times 3 \times 8$

(b) $\left(\frac{\text{input} - \text{kernel\_size} + 2 \times \text{padding}}{s}\right) + 1$

$= \frac{32 - 5 + 0}{2} + 1 = 14.$

output dimension

$14 \times 14 \times 8$

4.

$$\frac{I - F + 2P}{S} + 1 = 0$$

$$I - F + 2P + 1 = 0$$

since $0 = I$

$$2P = F - 1$$

$$P = \frac{F-1}{2}$$