1. $100 * 100 * 3 * 100 + 100 = 3,000,100$ parameters

2. $3 * 3 * 3 * 100 + 100 = 2800$ parameters

3.
   - Input: $(N, C_{in}, H_{in}, W_{in})$ or (C_{in}, H_{in}, W_{in})
   - Output: $(N, C_{out}, H_{out}, W_{out})$ or $(C_{out}, H_{out}, W_{out})$, where

$$H_{out} = \left\lfloor \frac{H_{in} + 2 \times \text{padding}[0] - \text{dilation}[0] \times (\text{kernel\_size}[0] - 1) - 1}{\text{stride}[0]} + 1 \right\rfloor$$

$$W_{out} = \left\lfloor \frac{W_{in} + 2 \times \text{padding}[1] - \text{dilation}[1] \times (\text{kernel\_size}[1] - 1) - 1}{\text{stride}[1]} + 1 \right\rfloor$$

   $dilation = 1$

   故输出特征图长宽均为$(63 + 2 - 5)/2 + 1 = 31$

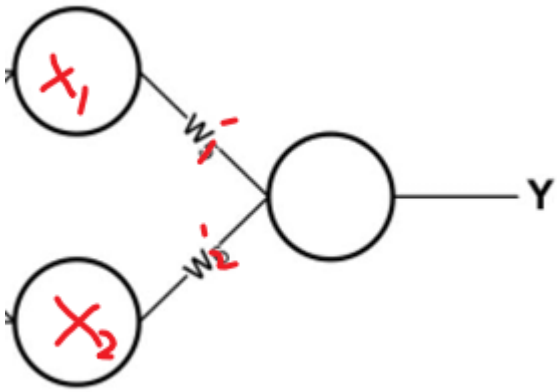
   故输出特征图维度为$31 * 31 * 32$

4. 填充大小 $padding = ((63 - 1) * 1 + 5 - 63)/2 = 2$

5. (1) $Y = (X_1 w_1 + X_2 w_3) w_5 + (X_1 w_2 + X_2 w_4) w_6$

   $= X_1(w_1 w_5 + w_2 w_6) + X_2(w_3 w_5 + w_4 w_6)$

   故新的神经网络如图



$w_1' = w_1 w_5 + w_2 w_6$

$w_2' = w_3 w_5 + w_4 w_6$

(2) $w_1 = 1, w_2 = -1, w_3 = 1, w_4 = -1, w_5 = 1, w_6 = -2$