COS 4892 Assignment 2

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1 Question 1

We will define

$$Q = ((Q_1 \wedge B) \vee (Q_2 \wedge \neg B)) \tag{1}$$

Now we calculate from Equation 1

$$
\begin{aligned}
Q \wedge B &= ((Q_1 \wedge B) \vee (Q_2 \wedge B)) \wedge B \\
&= (Q_1 \wedge B \wedge B) \vee (Q_2 \wedge \neg B \wedge B) \\
&= Q_1 \wedge B
\end{aligned} \tag{2}
$$

and

$$
\begin{aligned}
Q \wedge B &= ((Q_1 \wedge B) \vee (Q_2 \wedge B)) \wedge B \\
&= (Q_1 \wedge B \wedge \neg B) \vee (Q_2 \wedge \neg B \wedge \neg B) \\
&= Q_2 \wedge \neg B
\end{aligned} \tag{3}
$$