Quiz 11

(#) If, $\underbrace{x \text{ is not rational}}_{A}$, then $\underbrace{3x-1 \text{ is not rational}}_{B}$

1. **Contrapositive:**

   If $3x-1$ is rational, then so is x.

2. Start of contradiction proof:

   BWOC suppose x is not rational and $3x-1$ is rational

3. **Contrapositive:** suppose $3x-1$ is rational. Then $3x-1 = \frac{m}{n}$, $m, n \in \mathbb{Z}$, $n \neq 0$, so $3x = \frac{m}{n} + 1 = \frac{m+n}{n}$ and $x = \frac{m+n}{3n}$. Since $m+n, 3n \in \mathbb{Z}$ and $n \neq 0 \Rightarrow 3n \neq 0$, x is rational

   Contradiction: suppose x is not rational, but $3x-1$ is rational. Then (by argument above) x is rational, a contradiction.