Practice Exercises on Logical Connectives

1. State the contrapositive and converse. Also write the statement in an equivalent form using only $\sim$ and $\lor$.

   If $f$ is continuous on the interval $[a, b]$ and differentiable on the interval $(a, b)$, then there is a point $c$ in $(a, b)$ where $f'(c) = \frac{f(b) - f(a)}{b - a}$.

2. a) John is on the phone with his mother discussing Christmas plans. He has a sister Sally. He says:

   “I won't come home for Christmas unless Sally does.”

   Let $J$ be the proposition “John will come home for Christmas”
   Let $S$ be the proposition “Sally will come home for Christmas”

   Write what John meant in terms of $J$, $S$ and using “$\Rightarrow$”

   b) Using logical connectives, write

   “John will come home for Christmas but Sally won't.”

3. Write the contrapositive:

   “If the ocean was whiskey and I was a duck, I'd swim to the bottom and never come up.” (A line from a cowboy song sung by old-time cowboy movie star Tex Ritter.)