Student Name		Student ID		Section	
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(1) (5 points) Let p :"the bat screeches at night", q: "the sun will rise", r: "the bat eats the moth" and s : "the moth is on the ground".

Answer the following.

(a) Write the symbolic for :
The bat will screeches at night and eat the moth whenever the moth is on the ground or the sun will rise.

(b) Write the converse in English using unless :

The bat neither screech at night nor eat the moth is sufficient for both the moth is on the ground and the sun will rise .

(c) Write the negation in English for part (b) (origial statment)

(2) (7 points) Let $F(x)$: "x fools y ", $H(x)$: "x is honest", $N(x)$: "x is young" and $S(x)$: "x is swindler" . The domain for both x and y all persons.

Convert from English to symbolic and vice versa.

(a) $\forall y \forall x : H(x) \wedge S(y) \longrightarrow \neg F(x,y)$

(b) $\neg \exists x \forall y : S(x) \wedge [\neg N(y) \longrightarrow \neg F(x,y)]$
Write the English starting with "All swindlers ... "

(c) $\forall x : N(x) \longrightarrow F(x, Julian) \wedge H(Julian)$

(d) No swindler person fool all honest young persons.

(3) (3 points) Prove that the given logical proposition is tautology using logical equivalence rules
$(q \wedge p) \longrightarrow \neg(r \wedge \neg p)$