Homework 3

Name: _____

Date: _____

Part I

20 pts (5 pts per truth table)

1. (5 points) $R \to (S \to R)$
2. (5 points) $((F \wedge G) \to H) \to ((F \vee G) \to H)$
3. (5 points) $(A \leftrightarrow (B \vee C)) \to (\neg C \to \neg A)$
4. (5 points) $(A \leftrightarrow B) \wedge ((C \to \neg A) \wedge (B \to C))$

Part II

1. (20 points) Determine which sentences are logically equivalent to which.
   (a) $A \vee B$
   (b) $A \to B$
   (c) $\neg(A \wedge \neg B)$
   (d) $\neg(\neg A \wedge \neg B)$
   (e) $\neg A \vee B$
   (f) $A \vee \neg A$
   (g) $(A \to (A \wedge \neg A)) \to \neg A$

Part III

1. (10 points) If p is a sentence of TFL that is not a tautology, does it follow that $\neg p$ is a tautology?

Part IV

1. (16 total points) Suppose you have a trick deck of cards. To do your fancy magic, you have eliminated the entirety of the suit of diamonds. What is:
    1. (2 points) The probability that the card is hearts?
    2. (2 points) The probability that the card is not a king?
    3. (2 points) The probability that the card is hearts or diamonds?
    4. (2 points) The probability that the card is not a face card?
    5. (2 points) The probability that the card is diamonds and not an ace?
    6. (2 points) The probability that the card is not hearts and a king.
    7. (2 points) The probability that the card is a jack or a red queen?
    8. (2 points) The probability that the card is either not hearts or a face card?

Part V

1. (24 total points) Suppose that $Pr(S) = 0.33$, $Pr(V) = 0.33$, and $Pr(S \wedge V) = 0.1089$.
    1. (6 points) Are S and V consistent with one another?
    2. (6 points) Are S and V logically equivalent to one another?
    3. (6 points) What is the value of $Pr(S \vee V)$?
    4. (6 points) What is the value of $Pr((S \vee V) \wedge S)$?