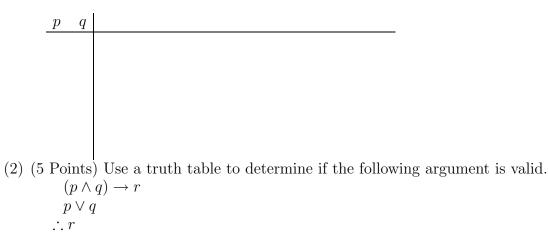
Mathematics 174 Test #1

Name:

Show your work to get credit. An answer with no work will not get credit.

(1) (5 Points) Make a truth table for $(p \lor q) \to (p \land q)$.



(3) (10 Points) Rewrite the following formally (that is with symbols and labeling the variables) and determine if it is valid argument. If Sally solved the problem correctly, then Sally obtained the answer z = 54. Sally obtained the answer z = 54.
∴ Sally solved the problem correctly. Formal restatement:

Valid or invalid?

Justification:

- (4) (15 Points) Write out the negations of the following sentences:
 (a) If x is an integer, then x(x + 1) is even.
 - (b) The sum of any two irrational numbers is irrational.
 - (c) Every mathematics student studies hard.
 - (d) For any student, if the student likes football, then this has been a good year for the student.
 - (e) There is a student that does not study, but gets A's.
- (5) (10 Points) Define the following(a) n is an even number.
 - (b) n is an odd number.
 - (c) n is a prime number.
 - (d) n is a composite number.
 - (e) b is a factor of n.

(6) (5 Points) Is $p \leftrightarrow \sim q$ logically equivalent to $(p \wedge \sim q) \vee (\sim p \wedge q)$. Justify your answer.

Justification:

answer

(7) (5 Points) Change the repeating decimal 4.545454545... to a ratio of interest.

(8) (5 Points) Change $53AD_{16}$ to base 10.

(9) (5 Points) Change 789_{10} to base 2.

- (10) (35 Points) For each of the following statements say if is true or false. If true give a proof. If false give a counterexample.
 - (a) The sum of four consective integers is even.

Ture or False?

Proof or counterexample:

(b) The sum of two odd numbers is divisable by 3.

Ture or False?

Proof or counterexample:

(c) For real numbers x and y, $(x + y)^3 = x^3 + y^3$. Ture or False?

Proof or counterexample:

(d) If n is odd then n(n+1) is even.

Proof or counterexample:

Ture or False?

(e) If n = 2k + 3 with k an integer, then $n^2 - 1$ is divisable by 4. Ture or False? Proof or counterexample: