

Extra Credit: The book "If you give a mouse a cookie" has what final conclusion? _____
Two sequels to the above book are "If you give a _____ a _____" and "If you give a _____ a _____".

1. Circle **True** or **False** for each of the following:

- a) $3 + 4 = 8$ if and only if $2 > 4$ **True** or **False**
- b) A parallel circuit is logically equivalent to an "OR" statement..... **True** or **False**
- c) A conditional statement is always true if the antecedent is false.....**True** or **False**
- d) The binary digits are the numerals 0, 1, and 2 **True** or **False**
- e) $(555)_6$ is the largest three-digit base 6 number..... **True** or **False**
- f) $(5A2D)_{13}$ is a valid base 13 number..... **True** or **False**
- g) $(11)_{12}$ is eleven base 12..... **True** or **False**
- h) " r is sufficient for s " is equivalent to $r \rightarrow s$ **True** or **False**
- i) $(323)_4, (333)_4, (1000)_4$ are consecutive numbers in base 4.....**True** or **False**
- j) $x^0 = (70)^0$ if and only if $x = 70$ **True** or **False**
- k) $(q \rightarrow \sim p) \rightarrow (p \rightarrow \sim q)$ is a tautology..... **True** or **False**
- l) The inverse of a direct statement is the contrapositive of the converse of the statement**True** or **False**
- m) $[(p \rightarrow q) \wedge \sim q] \rightarrow \sim p$ is an invalid argument representing a Fallacy of the Inverse.....**True** or **False**
- n) This is a valid argument: I'll be sick only if I eat bugs. I eat bugs. Therefore, I'm sick.....**True** or **False**
- o) $p \leftrightarrow q \equiv (p \rightarrow q) \vee (q \rightarrow p)$ **True** or **False**
- p) $[(q \rightarrow p) \wedge q] \rightarrow p$ is a valid Modus Ponens argument**True** or **False**

32 pts.

2. Write out each statement as indicated:

8 pts.

- (a) Write "Love is blind" in "If..., then..." form: _____
- (b) Contrapositive of (a): _____
- (c) Converse of (a) : _____
- (d) Negation of (a): _____

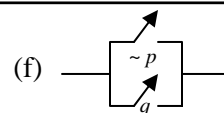
3. Write each statement in "If..., then..." form.

4 pts.

- (a) "Studying is necessary for passing" : _____
- (b) "No whole numbers are not integers" : _____

4. $p \rightarrow q$ is equivalent to which of the following (circle *all* that apply):

- (a) $p \wedge \sim q$ (b) $\sim p \vee q$ (c) $\sim p \rightarrow \sim q$ (d) $\sim q \rightarrow \sim p$ (e) q if p



6 pts

5. Give a single conclusion that yields a valid argument and uses each of (a)—(d). Let p be “you smile”, q be “you are happy”, r be “you are alert”, s be “you are a careful driver”, and t be “you have accidents”. **Write each statement in symbols on the line next to it, and indicate in symbols how you reached your conclusion!**

16 pts.

- (a) Careful drivers are alert. _____
 (b) No alert people are happy. _____
 (c) Careless drivers have accidents. _____
 (d) All unhappy people fail to smile. _____
 (e) State your conclusion:
 in symbols: _____ and in words _____

6. Use a truth table to determine if the following argument is **valid** or **invalid**. $(r \wedge p) \rightarrow (r \vee q)$
 (circle one) $q \wedge p$ _____
 $r \vee p$

10 pts.

7. Briefly indicate/justify your logic to decide if the following argument is **valid** or **invalid**?
 (You do Not need a Truth Table.) (circle one)

8 pts.

If Tennessee wins, we sing Rocky Top.
 If we don't sing Rocky Top, the babies cry.
 The babies don't cry or there is a traffic jam.
 There is not a traffic jam. Therefore, Tennessee wins.

8. Consider the statement $(\sim q \wedge p) \vee [\sim q \wedge (p \vee \sim p)]$.

16 pts.

(a) (5pts) Sketch the circuit that represents this statement **as it is given**.

(b) (9pts) Determine if the circuit can be simplified, and if so, **draw** the simplified circuit.

(c) (2pts) Is the designer of the original circuit **a genius** or **a moron**? (circle one).

20 pts.

9. Perform the following base conversions. *Show your work!*

(a) (5pts) Convert $(2012)_3$ to decimal.

(b) (5pts) Convert 7,508 to base 7.

Answer:

Answer:

(c) (10pts) Convert $(2A6)_{16}$ to a base 5 number. *Hint: Go through base 10!*

Answer:

10. Perform the following base conversions. Indicate your work!

16 pts.

(a) (4pts) Convert $(10101110101101)_2$ to octal.

(b) (4pts) Convert $(90F)_{16}$ to binary.

(c) (8pts) Convert $(310546)_8$ to hexadecimal. *Hint: Go through base 2!*

11. The following questions relate to Table 6.

14 pts.

(a) (5pts) Explain why $(1101)_2 = (15)_8 = (D)_{16}$. (*Use math and words*).

(b) (4pts) If Table 6 were extended to include three more row, what would they be?

(d) (5pts) If Table 6 were extended to include a column titled "Ternary (Base Three)", give the corresponding results that would be listed in the first 10 rows.

Extra Credit(+4pts): Use your new column to convert the following base 9 number to its equivalent base 3 representation. Hint: $3^2 = 9$. $(52)_9 = (\text{_____})_3$.