

Test Total

Name \_\_\_\_\_

Test 1 Introduction to Discrete Mathematics 3450:208 Dr. Norfolk

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Show your work.

1. Consider the conditional  $E = "p \vee \sim q \rightarrow r"$ .

Use de Morgan's laws to write simplified versions of the following :

- The *negation* of  $E$  :

5 points

- The *inverse* of  $E$  :

5 points

- The *converse* of  $E$  :

5 points

- The *contrapositive* of  $E$  :

5 points

2. Fill in the truth table below.

$p$	$q$	$r$			$p \rightarrow q \wedge \sim r$

10 points

Page 1 Total

3. Determine if the following argument is valid. Justify your answer.

$$p \vee q \rightarrow \sim r$$

$$\sim p \wedge \sim q$$

Therefore,  $r$

10 points

4. Write a *boolean expression* which will generate the following *Karnaugh map* :

$z \backslash xy$	1,1	1,0	0,0	0,1
1	1	1	0	1
0	0	0	0	1

5 points

5. (a) Convert  $101\ 1110\ 1001_2$  to *decimal*.

5 points

Page 2 Total

- (b) The value of  $2733_{10}$  in binary is  $1010\ 101x\ y101_2$ . Find the values of the unknown digits  $x$  and  $y$ .

10 points

- (c) Convert  $7B9FC_{16}$  to *binary*.

5 points

- (d) The value of an integer  $x$  in hexadecimal is  $11B9_{16}$ . What is the value of  $256x + 42$  in hexadecimal? (Hint :  $256 = 16^2$ ).

5 points

6. Write the *truth set* for the predicate  $P(n) = "n^2 > 1000"$ , with domain the set of *integers*,  $\mathbb{Z}$  ?

5 points

Page 3 Total