1. [4 marks] Given that p is TRUE and q is FALSE, state whether each proposition is TRUE or FALSE:

a) $p \oplus q$

TRUE

b) $\sim q \vee p$

TRUE

c) $\sim (q \vee p)$

FALSE

d) $\sim q \wedge p$

TRUE

2. [4 marks] a) Build the truth table for $(\sim p \wedge q) \vee (p \wedge \sim q)$.

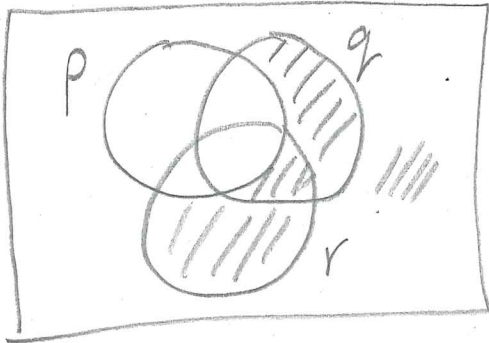| p	q	$\sim p$	$\sim p \wedge q$	$\sim q$	$p \wedge \sim q$	$(\sim p \wedge q) \vee (p \wedge \sim q)$
0	0	1	0	1	0	0
0	1	1	1	0	0	1
1	0	0	0	1	1	1
1	1	0	0	0	0	0

Question 2 was removed from the test.

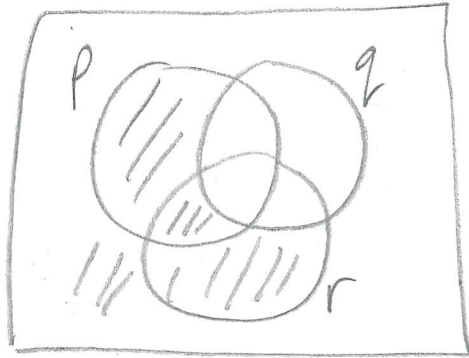b) Is $(\sim p \wedge q) \vee (p \wedge \sim q)$ logically equivalent to $p \oplus q$? State YES or NO.

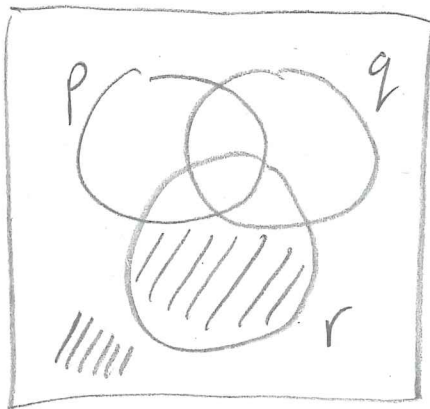| p	q	$p \oplus q$
0	0	0
0	1	1
1	0	1
1	1	0

YES (Columns are identical.)

3. [4 marks] Draw the Venn diagram for $(\sim p \wedge \sim q) \vee r$.
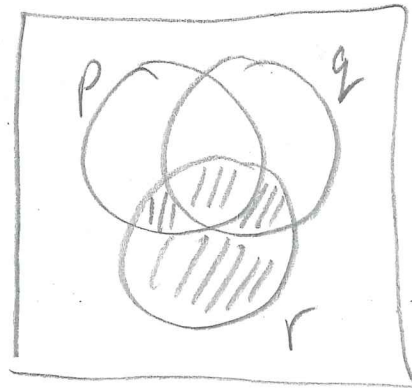

$\sim p$

$\sim q$

$\sim p \wedge \sim q$

$(\sim p \wedge \sim q) \vee r$

4. [6 marks] Convert to decimal:

a) $DAE5_{16}$

$$= D \times 16^3 + A \times 16^2 + E \times 16^1 + 5 \times 16^0$$

$$= 13 \times 16^3 + 10 \times 16^2 + 14 \times 16 + 5$$

$$= 56\ 037$$

b) 372.64_8

$$= 3 \times 8^2 + 7 \times 8^1 + 2 \times 8^0 + 6 \times 8^{-1} + 4 \times 8^{-2}$$

$$= 3 \times 8^2 + 7 \times 8 + 2 + \frac{6}{8} + \frac{4}{8^2}$$

$$= 250.8125$$

5. [4 marks] Convert 85.71875 to octal.

	Q	R
$85 \div 8$	10	5
$10 \div 8$	1	2
$1 \div 8$	0	1

0.71875×8	I	N
	5	0.75
0.75×8	6	0

$$125.56_8$$

6. [3 marks] Convert 0.3 to binary.

	I	N
0.3×2	0	0.6
0.6×2	1	0.2
0.2×2	0	0.4
0.4×2	0	0.8
0.8×2	1	0.6
0.6×2		

$$0.0\overline{1001}_2$$