Term: 2022 Name: Solution Set

Instructor: Patricia Wrean

MATH 156-X01
Practice Test 1A

Total = $\frac{\quad}{30}$

- **All of the work on this test must be your own.**
- You may use a scientific calculator. You may not use a calculator with graphing capability or a smartphone app.

GOOD LUCK!

1. (10 points) Convert the following numbers into the indicated base. Give exact answers (do not round) and show your work.

(a) 52340_6 to decimal

7044 or 7044_{10}

$52340_6 = 5\times6^4 + 2\times6^3 + 3\times6^2 + 4\times6^1 + 0$

$= 7044$

3

(b) $3E.6E_{16}$ to octal

76.334_8

$3E.6E_{16} = 0011\ 1110.\ 0111\ 1110_2$ (-½ no base)

$= 111\ 110.\ 011\ 011\ 100_2$

$= 76.334_8$

(c) 0.55 to binary

$0.1\overline{0011}_2$

	int	non-int
$0.55\times2 =$	1	+ 0.1
$0.1\times2 =$	0	+ 0.2
$0.2\times2 =$	0	+ 0.4
$0.4\times2 =$	0	+ 0.8
$0.8\times2 =$	1	+ 0.6
$0.6\times2 =$	1	+ 0.2

repeat

(-½ no base)

(-1 incorrect repeater bar)

(-1 no repeater bar)

(-½ if wrote Q & R instead of int/non-int)

2. (4 points) Convert 162.046875 to hexadecimal. Give an exact answer. Show your work.

	Q	R
$162 \div 16$	10	2
$10 \div 16$	0	$10 = A$

$162 = A2_{16}$

$A2.0C_{16}$

int non-int

$0.046875 \times 16 = 0 + 0.75$

$0.75 \times 16 = 12 + 0$ → C

$0.046875 = 0.0C_{16}$

if 0.75, −1/2

3. (2 points) Does the number 10011100_{16} exist? (Is it a legal number in hexadecimal?) Explain briefly.

yes, 0 and 1 are allowed digits in hexadecimal

(10011100_{16} is just a really big number!)

4. (3 points) Let p denote "Ly likes cake" and q denote "Ly likes pie". Rewrite the following English sentences in terms of logical symbols (i.e. $p \wedge q$, $p \vee q$). Do not simplify!

(a) Ly likes cake or pie but not both. $p \oplus q$

(b) It is not true that Ly doesn't like pie. $\sim(\sim q)$

(c) Ly likes pie but not cake. $q \wedge \sim p$

5. (3 points) Circle all statements below which are the negation of the statement "At least three of the lights are on."

≥ 3, so negation is < 3 or ≤ 2

because number of lights is an integer

(a) At most three of the lights are on.

(b) Not all of the lights are on.

(c) The number of lights that are on is less than or equal to two.

(d) No lights are on.

(e) Less than three of the lights are on.

(1) for c)
(1) for e)
(1) for not choosing anything else!

6. (4 points) Simplify the logical expression $(\sim q \oplus 1) \vee (q \wedge p)$. Use a truth table to justify your answer.

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

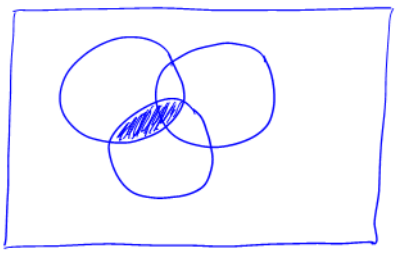
q

(-½) per mistake for max of (-1) per column

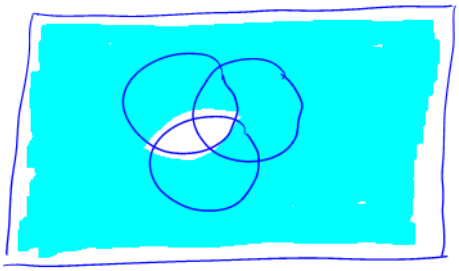
(-1) no conclusion

(-1) only simplified to $\sim q \oplus 1$

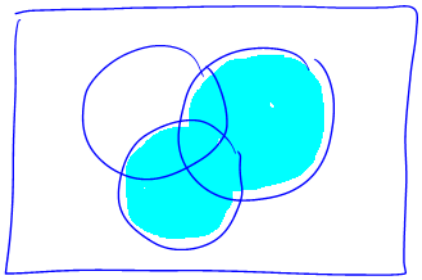
7. (4 points) Represent $\sim(p \wedge r) \wedge (q \vee r)$ on the following Venn diagram by shading in the appropriate regions. Show intermediate steps on separate sketches and label them clearly to get full credit.



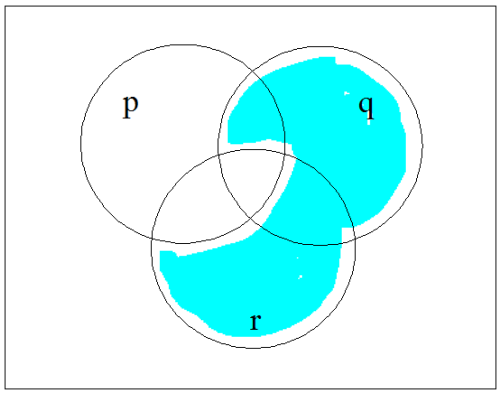
$p \wedge r$



$\sim(p \wedge r)$



$q \vee r$



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

(-1) per mistake for max of (-2) per diagram

(-3) no intermediate sketches