

Review for Final

Thursday, December 07, 2023 4:32 PM

① convert 29362 to hexadecimal

	Q	R	
$29362 \div 16$	1522	10 = A	↑
$1522 \div 16$	95	2	
$95 \div 16$	5	15 = F	
$5 \div 16$	0	5	

5F2A₁₆

② convert 57.024₈ to hexadecimal

$$57.024_8 = 10111.000010100_2 = 2F.0A_{16}$$

octal	binary
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

③ convert 0.9 to octal. Give an exact answer (do not round).

	int	non-int
$0.9 \times 8 =$	7	+ 0.2
$0.2 \times 8 =$	1	+ 0.6
$0.6 \times 8 =$	4	+ 0.8
$0.8 \times 8 =$	6	+ 0.4
$0.4 \times 8 =$	3	+ 0.2

0.71463₈

④ Use the laws of logic to simplify:

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

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

idempotent

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

De Morgan's

$$\sim p$$

absorption

5) simplify using the laws of logic

$$(\overline{A+B}) \overline{A+C}$$

method #1:

$$(\overline{A+B}) \overline{A} \overline{C}$$

De Morgan's

$$\overline{A} \overline{C}$$

absorption

$$(\overline{A+B}) \overline{A+C}$$

method #2

$$(\overline{A+B}) \overline{A} \overline{C}$$

De Morgan's

$$\overline{A} \overline{A} \overline{C} + \overline{B} \overline{A} \overline{C}$$

distributive

$$\overline{A} \overline{C} + \overline{B} \overline{A} \overline{C}$$

idempotent

$$\overline{A} \overline{C} (1 + \overline{B})$$

distributive

$$\overline{A} \overline{C} \cdot 1$$

identity

$$\overline{A} \overline{C}$$

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$$(\overline{A+B}) \overline{A+C}$$

method #3:

$$\overline{AB} \quad \overline{A+C}$$

De Morgan's

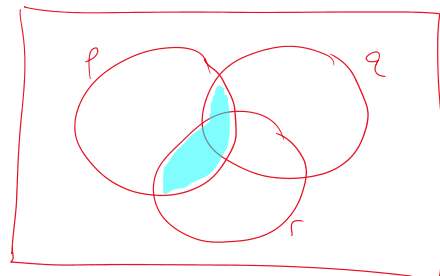
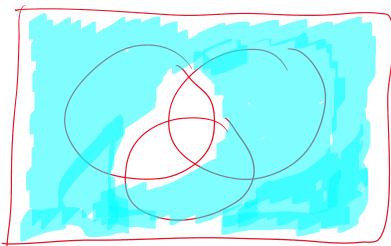
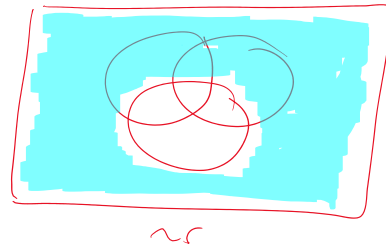
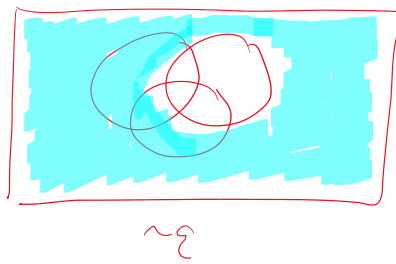
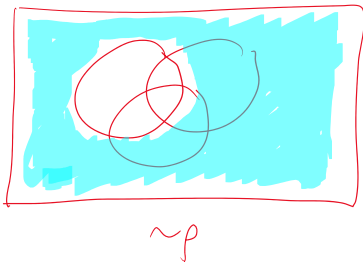
$$\overline{AB + A + C}$$

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either $\left\{ \begin{array}{l} \overline{A+C} \\ \overline{A}\overline{C} \end{array} \right.$ absorption
DeMorgan's

Review: cont'd 2023/12/08

⑥ Represent $\sim(\sim p \vee \sim q \wedge \sim r)$ on a Venn diagram by shading in the appropriate regions. Show intermediate steps on separate sketches and label them clearly to receive full credit.



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

7) Is $\overline{A \overline{B}} (\overline{A \oplus B})$ logically equivalent to zero? Justify your answer using a truth table.

A	B	\overline{A}	\overline{B}	$\overline{A \oplus B}$	$\overline{A \overline{B}}$	$\overline{\overline{A \overline{B}}}$	$\overline{\overline{A \overline{B}}} (\overline{A \oplus B})$
0	0	1	1	0	1	0	0
0	1	1	0	1	0	1	1
1	0	0	1	1	0	1	1
1	1	0	0	0	0	1	0

No

8) Consider the following:

$$r = -3$$

$$\frac{1}{9}, -\frac{1}{3}, 1, -3, \dots$$

- Is it a sequence or a series?
- Is it arithmetic, geometric, or neither?
- Write a general formula for a_n .
- Write a recursive formula for a_n .

sequence
geometric

answer: c) geo with $r = -3$

$$a_n = a_m r^{n-m}$$

$$a_n = \frac{1}{9} (-3)^n \quad \text{for } n \geq 0$$

$$\text{or } a_n = \frac{1}{9} (-3)^{n-1} \quad \text{for } n \geq 1$$

$$d) \quad \begin{cases} a_0 = 1/9 \\ a_n = -3 a_{n-1} \end{cases} \quad \text{for } n > 0$$

9) Evaluate:

$$a) \quad 5 + 15 + 25 + \dots + 205$$

arithmetic with $d = 10$

how many terms?

$$a_n = a_m + (n-m)d$$

$$205 = 5 + (n-1)10$$

$$200 = 10(n-1)$$

$$20 = n-1$$

$$n = 21$$

$$\begin{aligned} k &= n - m + 1 \\ &= 21 - 1 + 1 \\ &= 21 \end{aligned}$$

$$S_k = \frac{k}{2} (a_n + a_m)$$

$$S_{21} = \frac{21}{2} (5 + 205) = 2205$$

10) The following statement is true:

"If Hen did not shoot first
then fans are unhappy."

a) Fans are unhappy. Did Hen shoot first? maybe

b) Fans are happy. Did Hen shoot first? yes

shoot	happy	\sim shoot	\sim happy	\sim shoot \rightarrow \sim happy
0	0	1	1	1
0	1	1	0	0
1	0	0	1	1
1	1	0	0	1