

Term: Fall 2023

Name: Solution Set

Instructor: Patricia Wrean

MATH 156-X01
Test 1, Version B

Total = $\overline{25}$

- 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. You may not share calculators between students.

GOOD LUCK!

1. (8 points) Convert the following numbers into the indicated base. Give exact answers (do not round) and show your work.

(a) $A7.29_{16}$ to octal

$$\underline{247.122_8}$$

$$\begin{aligned} A7.29_{16} &= 1010\ 0111.0010\ 1001_2 \\ &= 247.122_8 \end{aligned}$$

2

(b) 14.1875 to base 4

$$\underline{32.03_4}$$

	Q	R	
$14 \div 3$	3	2	↑
$3 \div 4$	0	3	

$$\begin{aligned} 0.1875 \times 4 &= \overset{\text{int}}{0} + \overset{\text{non-int}}{0.75} \\ 0.75 \times 4 &= \overset{\text{int}}{3} + 0 \end{aligned}$$

4

(c) 76012_8 to decimal

$$\underline{31754 \text{ (or } 31754_{10}\text{)}}$$

$$76012_8 = 7 \times 8^4 + 6 \times 8^3 + 0 + 1 \times 8^1 + 2 \times 8^0$$

$$= 28672 + 3072 + 0 + 8 + 2 \quad \leftarrow \text{can skip this step}$$

$$= 31754$$

2

2. (3 points) Convert 0.52 to hexadecimal. Give an exact answer. Show your work.

$$\underline{0.851EB_{16}}$$

$$\begin{aligned} 0.52 \times 16 &= 8 & + 0.32 \\ 0.32 \times 16 &= 5 & + 0.12 \\ 0.12 \times 16 &= 1 & + 0.92 \\ 0.92 \times 16 &= 14^E & + 0.72 \\ 0.72 \times 16 &= 11^B & + 0.52 \end{aligned}$$

- (-1/2) no base
- (-1) incorrect
repeater bar
- (-1) no repeater bar
- (-1/2) if wrote Q + R
instead of int/non-int

3. (1 point) Consider the number 16_{16} . Is it a legal number in hexadecimal? Explain briefly.

yes, 1 and 6 are legal digits in hexadecimal

$$(\text{in fact, } 16_{16} = 1 \times 16^1 + 6 \times 16^0 = 16 + 6 = 22_{10})$$

4. (3 points) Answer the questions given the following situations with “Yes”, “No”, or “Maybe”.

(a) Zack programs in Java and Python. Does he program in Python? Yes / No / Maybe

(b) Chedo programs in Java. Does he program in Java and Python? Yes / No / Maybe

(c) Lynda programs in Java but not Python. Does she program in Python?

Yes / No / Maybe

5. (3 points) Let p denote “Gord likes cocoa”, q denote “Leah likes cocoa”, and $r =$ “Leah likes tea”. Rewrite the following English sentences in terms of logical symbols (i.e. $p \wedge q$, $p \vee q$). Do not simplify!

(a) Leah likes tea but not cocoa.

$$\underline{r \wedge \sim q}$$

(b) Leah likes cocoa or Gord does not like cocoa but not both.

$$\underline{q \oplus \sim p}$$

(c) It's not true that both Gord and Leah do not like cocoa.

$$\underline{\sim(\sim p \wedge \sim q)}$$

6. (3 points) Circle all statements below which are the negation of the statement “All of the doors are locked.”

(a) At least one of the doors is locked.

(b) At least one of the doors is unlocked.

(c) Not all of the doors are locked.

(d) Some of the doors are unlocked. *

(e) All of the doors are unlocked.

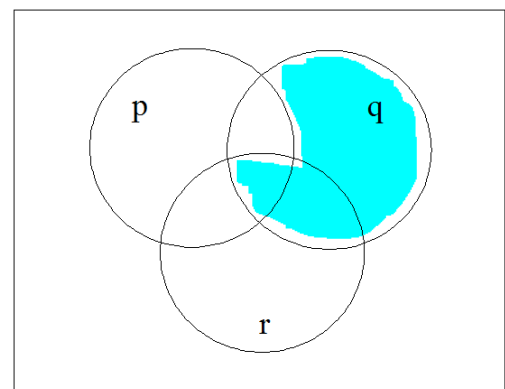
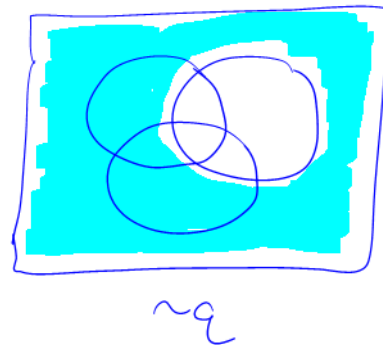
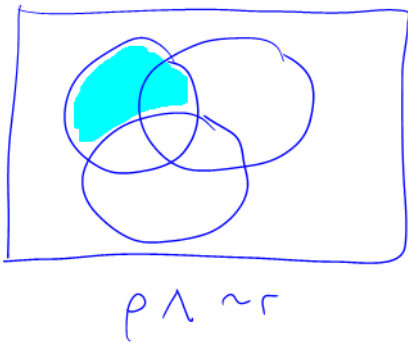
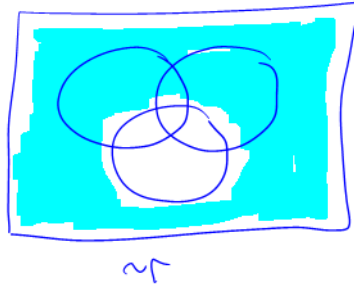
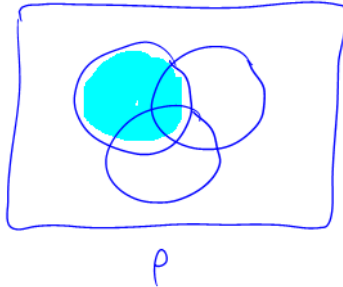
(a) b

(d) c

(e) not choosing anything else

* there is a bit of controversy in the math dept about the use of “some” so I accepted both circled and uncircled as correct here

7. (4 points) Represent $\sim(\sim q \vee p \wedge \sim r)$ 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.



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

-1 per mistake for max of
 -2 per diagram
 -3 no intermediate sketches