

Term: Winter 2024

Name: Solution Set

Instructor: Patricia Wrean

MATH 156
Test 1, Version A

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

(a) $70BE_{16}$ to decimal

28862 (or 28862₁₀)

$$\begin{aligned} 70BE_{16} &= 7 \times 16^3 + 0 + 11 \times 16^1 + 14 \times 16^0 \\ &= 28672 + 0 + 176 + 14 \\ &= 28862 \end{aligned}$$

2

(b) 36.527_8 to hexadecimal

1E.AB₁₆

$$\begin{aligned} 36.527_8 &= 011 \mid 110.101 \mid 010 \mid 11000_2 \\ &= 1E.AB_{16} \end{aligned}$$

2

(c) 0.4625 to octal

0.354631₈

		int	+	non-int
0.4625	$\times 8 =$	3	+	0.7
0.7	$\times 8 =$	5	+	0.6
0.6	$\times 8 =$	4	+	0.8
0.8	$\times 8 =$	6	+	0.4
0.4	$\times 8 =$	3	+	0.2
0.2	$\times 8 =$	1	+	0.6

A red arrow points from the 0.7 in the second row down to the 0.6 in the eighth row. A blue box encloses the entire table. A blue arrow points from the 0.6 in the eighth row back to the 0.6 in the third row.

3

2. (4 points) Convert 57.375 to base 4. Give an exact answer (do not round) and show your work.

$$\begin{array}{r|l} & \text{Q} \\ \hline 57 \div 4 & 14 \\ 14 \div 4 & 3 \\ 3 \div 4 & 0 \end{array} \quad \begin{array}{l} \text{R} \\ \hline 1 \\ 2 \\ 3 \end{array} \uparrow$$

$$\begin{array}{r} 0.375 \times 4 = \text{int } 1 + \text{non-int } 0.5 \\ 0.5 \times 4 = \text{int } 2 + 0 \end{array}$$

$$\underline{321.12_4}$$

3. (1 point) Consider the number $DEED_{15}$. Is this a legal number in base 15? Explain briefly.

base 15 has digits 0-9 and A-E

D and E are included

so yes

4. (3 points) For the pair of sentences below, is the second the negation of the first? Answer by selecting the correct choice.

- (a) Less than four cars are hybrids. ^{does not include exactly 4 cars} More than four cars are hybrids. Yes / No
- (b) All of the plants are blooming. ^{not all ≠ none} None of the plants are blooming. Yes / No
- (c) There are no bugs in this program. ₀ There are one or more bugs in this program. _{1, 2, 3, ...} Yes / No

5. (3 points) Answer the questions given the following situations with “Yes”, “No”, or “Maybe”.

- (a) Priya likes pop music. Does she like pop or jazz music? Yes / No / Maybe
- (b) Kirsten does not like pop music. Does she like pop and jazz music? Yes / No / Maybe
- (c) Rinka likes classical or pop music. Does she like classical music? Yes / No / Maybe

6. (3 points) Let p denote “This dish needs pepper.” and q denote “This dish needs salt”. Rewrite the following English sentences in terms of logical symbols (i.e. $p \wedge q$, $p \vee q$). Do not simplify!

- (a) This dish needs pepper but not salt. $p \wedge \sim q$
- (b) It is not true that this dish does not need salt. $\sim(\sim q)$
- (c) This dish does not need salt and it does not need pepper. $\sim q \wedge \sim p$

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

Note: if you want, you can use the blank Venn diagrams on the next pages. Just make sure to label them clearly.

