

Table Number: _____

Group Name: _____

Group Members: _____

Order of Operations; Use of the Calculator; Summation Notation

ORDER OF OPERATIONS

Consider each completed problem.

1.

a) On each line, write which operation was used to get to each step.

$$4 + (6 + 1) \times 2^3 - 9 \quad \underline{\hspace{2cm}}$$

$$4 + (6 + 1) \times 8 - 9 \quad \underline{\hspace{2cm}}$$

$$4 - 7 \times 8 + 9 \quad \underline{\hspace{2cm}}$$

$$4 - 56 + 9 \quad \underline{\hspace{2cm}}$$

$$-52 + 9 \quad \underline{\hspace{2cm}}$$

$$-43 \quad \underline{\hspace{2cm}}$$

b) Explain why the last two operations happened in that order.

2. Joe completed the problem in the following way. Find his mistake, then correct it and find the correct answer.

$$90 \div 5 \times 9 - (3 - 2) + 1 \times 4$$

$$90 \div 5 \times 9 - 1 + 1 \times 4$$

$$90 \div 45 - 1 + 1 \times 4$$

$$2 - 1 + 1 \times 4$$

$$1 + 1 \times 4$$

$$1 + 4$$

$$5$$

3. Natalie completed the problem in the following way. Is she correct? If not, fix her mistake.

$$\{2 \times 5\} - 2 - 8 + 4 - 16 \div 2$$

$$\{10\} - 2 - 8 + 4 - 16 \div 2$$

$$\{10\} - 6 + 4 - 16 \div 2$$

$$4 + 4 - 16 \div 2$$

$$4 + 4 - 8$$

$$8 - 8$$

$$0$$

Complete the following problems. Show your steps and write which operation was used in each step. Round your final answer to 2 decimal places.

4. $\frac{2-(3+4)}{18-8 \cdot 2}$

5. $\frac{4.78-8.3}{1.4+5.4}$

6. $\frac{3(0.5-4)-(7-2)}{2.3+8.1}$

CALCULATOR PRACTICE

7. Use your calculator to compute the following.

a) 18^2

b) 4^3

c) 3^4

8. Use the order of operations and your calculator to complete the following. Round your final answer to hundredths.

a) $2+3\left(2+\frac{5}{7}\right)^2$

b) $\sqrt{225} - 5 - (6-1.8)^2 - 9$

c) $\frac{(5-4.3)^3}{2.3-0.1}$

9. Use your calculator to compute the following. Round your final answer to thousandths (if necessary).

a) $\sqrt{225}$

b) $\sqrt{59}$

c) $\sqrt{11.75}$

d) $\sqrt{0.005}$

10. Use the order of operations and your calculator to complete the following. Round your final answer to thousandths.

a) $5 + \sqrt{2+15} - 4$

b) $1.87 - 2\sqrt{7.89+2.3}$

c) $0.004 + \sqrt{3.25+187} \div 5$

d) $\sqrt{\frac{(0.88)(1-0.12)}{458}}$

ORDER OF OPERATIONS IN FORMULAS

Consider the following formulas and values for each variable. Calculate the value of each indicated variable.

11. $\bar{X} = \frac{a_1 + a_2 + a_3}{n}$; $a_1 = 2.3$, $a_2 = 7.12$, $a_3 = 0.5$, $n = 3$. Find the value of \bar{x}

12. $z = \frac{x - \bar{x}}{s}$; $x = 57.5$, $\bar{x} = 53.2$, $s = 4.54$. Find the value of z .

13. $z = \frac{x - \mu}{\sigma}$; $x = 1.07$, $\mu = 1.25$, $\sigma = 0.21$. Find the value of z .

14. $\sigma = \sqrt{\frac{p(1-p)}{n}}$; $p = 0.75$, $n = 1032$. Find the value of σ .

SUMMATION NOTATION

15. Jose earned the following test scores: 85, 72, 89, 65.

- Determine the average, or *arithmetic mean*, of his test scores.
- Write out the mathematical steps you took to calculate the mean.

To write the **mean** as a formula, we use the following notation:

$$\bar{x} = \frac{\sum_{i=1}^n a_i}{n},$$

where n numbers are given, and each number is denoted by a_i , where $i = 1, 2, \dots, n$. The symbol \sum is the Greek letter, **sigma**, and is shorthand for telling us to “take the sum” or “add all these numbers together.”

So for an arithmetic mean, we add up all of the values in a sequence, then divide by the number of values in the sequence.

16. For Jose's test scores above, what does n equal?

17. List the values of the a_i .

18. Suppose that $a_1 = 5$, $a_2 = 8$, $a_3 = 2$, $a_4 = 5$, and $a_5 = 7$. Determine $\sum_{i=1}^5 a_i$.

Now suppose that instead of a list of numbers, we have a formula for a_i : $a_i = 2i + 3$

Then we can evaluate $\sum_{i=1}^3 a_i$ (or in other notation, $\sum_{i=1}^3 (2i + 3)$)

19.

a) Determine the values of a_1, a_2, a_3

b) Evaluate $\sum_{i=1}^3 a_i$.

20. Determine the value of $\sum_{i=1}^4 (3i - 1)$

SOLVING EQUATIONS

Solve each of the following equations for the indicated variable.

21. $3 = \frac{x-7}{2}$; Solve for x .

22. $1.25 = \frac{x-7.8}{0.5}$; Solve for x .

23. $-0.5 = \frac{x-2.57}{0.31}$; Solve for x .

24. $2.15 = \frac{108.1-110}{s}$; Solve for s

25. $-1.1 = \frac{4.1-\bar{x}}{0.21}$; Solve for \bar{x}