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MATH 101

Spring 2022

HW 4: Due 02/17

*“Not everyone can become a great artist,
but a great artist can come from
anywhere.”*

—Anton Ego, Coco

Problem 1. (10pt) Write the following numbers in scientific notation:

(a) 126

(b) 5

(c) 0.0000034

(d) 163000000

Solution.

(a)

$$126 = 1.26 \cdot 10^2$$

(b)

$$5 = 5.0 \cdot 10^0$$

(c)

$$0.0000034 = 3.4 \cdot 10^{-6}$$

(d)

$$163000000 = 1.63 \cdot 10^8$$

Problem 2. (10pt) Write the following numbers in decimal notation:

(a) $1.7 \cdot 10^3$

(b) $9.3 \cdot 10^0$

(c) $1.32 \cdot 10^8$

(d) $4.8 \cdot 10^{-5}$

Solution.

(a)

$$1.7 \cdot 10^3 = 1700$$

(b)

$$9.3 \cdot 10^0 = 9.3$$

(c)

$$1.32 \cdot 10^8 = 132\,000\,000$$

(d)

$$4.8 \cdot 10^{-5} = 0.000\,048$$

Problem 3. (10pt) Suppose a course grade consists of the following weights:

Homework	40%
Quizzes	10%
Exam 1	20%
Exam 2	20%
Project	10%

Suppose a student had a 81% homework average, 70% quiz average, 85% on exam 1, 74% on exam 2, and 93% on the project. Compute the student's course average.

Solution.

$$\begin{aligned}\text{Course Average} &= 40(0.81) + 10(0.70) + 20(0.85) + 20(0.74) + 10(0.93) \\ &= 32.4 + 7 + 17 + 14.8 + 9.3 \\ &= 80.5\end{aligned}$$

Problem 4. (10pt) Suppose a GPA consists of the following weights:

A	4.0	C+	2.3
A−	3.7	C	2.0
B+	3.3	C−	1.7
B	3.0	D	1.0
B−	2.7	F	0.0

Suppose a student had the following grades on their courses: Compute this student's GPA.

Course	Credits	Grade
Calculus II	4	B+
Sophomore Seminar	1	A
Chemistry II	4	B−
Women in Music	3	B+
German Philosophy Pre-1950	3	C+
American Poets	3	D

Solution.

$$\begin{aligned}
 \text{GPA} &= \frac{\text{Sum Credit} \cdot \text{Credit}}{\text{Course Weight}} \\
 &= \frac{4(3.3) + 1(4.0) + 4(2.7) + 3(3.3) + 3(2.3) + 3(1.0)}{4 + 1 + 4 + 3 + 3 + 3} \\
 &= \frac{13.2 + 4.0 + 10.8 + 9.9 + 6.9 + 3.0}{18} \\
 &= \frac{47.8}{18} \\
 &= 2.656
 \end{aligned}$$

Problem 5. (10pt) Compute the following:

(a) $(4 - i) - (6 - 10i)$

(b) $(1 - 3i)(2 + 4i)$

(c) $(2i)^3$

(d) $\frac{5 + i}{1 - 2i}$

Solution.

(a)

$$(4 - i) - (6 - 10i) = 4 - i - 6 + 10i = -2 + 9i$$

(b)

$$(1 - 3i)(2 + 4i) = 2 + 4i - 6i - 12i^2 = 2 + 4i - 6i - 12(-1) = 2 + 4i - 6i + 12 = 14 - 2i$$

(c)

$$(2i)^3 = 2i \cdot 2i \cdot 2i = 4i^2 \cdot 2i = 4(-1) \cdot 2i = -4 \cdot 2i = -8i$$

(d)

$$\begin{aligned} \frac{5 + i}{1 - 2i} &= \frac{5 + i}{1 - 2i} \cdot \frac{1 + 2i}{1 + 2i} \\ &= \frac{5 + 10i + i + 2i^2}{1 + 2i - 2i - 4i^2} \\ &= \frac{5 + 11i + 2(-1)}{1 - 4(-1)} \\ &= \frac{5 + 11i - 2}{1 + 4} \\ &= \frac{3 + 11i}{5} \\ &= \frac{3}{5} + \frac{11}{5}i \end{aligned}$$