Practice Test 4. Numbers

Math 300

Last Name	First Name	Date

This assignment is closed books. One 2-sided US Letter sheet of notes is OK.

All your scratch work will be collected with the test and discarded.

All electronic devices besides approved calculators and computers running approved software are prohibited.

Fully justify your answers and show all work
in order to maximize your partial credit.

1 (12 points)**.** Convert the given number into base 10. Show work.

(a) 21012_3

(b) 666_9

(c) $CAFE_{16}$

(d) 101.101_2

2 (3 points)**.** Write 100 in base 2. Show work.

3 (3 points)**.** Write 88 in base 7. Show work.

4 (3 points). Write 1000 in base 5. Show work.

5 (3 points). Write 1776 in base 16. Show work.

6 (10 points)**.** For each expression, perform the multiplication and simplify the result by combining like terms. Show all work.

(a) $(10x - 4y)(5x + 6y)$

(b) $(1 + 10x + 100x^2)(1 - x + x^2)$

7 (12 points). Find the GCF for each expression. Do not factor.

(a) $27 - 30a$

(b) $120b^7 + 144b^3$

(c) $12c^2d - 30cd^2$

(d) $10k + 100k^2 + 1000k^3$

(e) $x^4y^2z^3 + x^3y^5z^2 + x^3y^4z^3$

8 (14 points). Factor each polynomial completely:

(a) $x^2 + 11x + 28$

(b) $x^2 - 14x + 45$

(c) $x^5 + 3x^4 - 54x^3$

(d) $4x^3 - 8x^2 - 60x$

9 (10 points). A sequence is defined by

$$a_1 = 368$$

$$a_n = \frac{a_{n-1} + 7}{3} \quad \text{if } n > 1$$

Find the following members of the sequence. Show work.

$a_2 =$

$a_3 =$

$a_4 =$

$a_5 =$

$a_6 =$

10 (10 points). A sequence is defined by

$$\begin{aligned} a_1 &= 1 \\ a_2 &= 2 \\ a_3 &= 3 \\ a_n &= a_{n-1} - a_{n-2} + a_{n-3} \text{ if } n > 3 \end{aligned}$$

Find the following members of the sequence. Show work.

$a_4 =$

$a_5 =$

$a_6 =$

$a_7 =$

11 (12 points). Simplify and state the answer in the standard form $a + bi$:

(a) $(-8+3i)-(4-9i) =$

(b) $(5+8i)(5-8i) =$

(c) $(6+7i)(7-6i) =$

(d) $\dfrac{25+15i}{3-i} =$

(e) $(-i)^{1917} =$

12 (8 points)**.** A sequence is defined by

$$z_1 = 3+4i$$

$$z_n = i(2-z_{n-1}) \text{ if } n>1$$

Find the following members of this sequence and state them in the standard form $a+bi$. Show work.

(a) $z_2 =$

(b) $z_3 =$

(c) $z_4 =$

(d) $z_5 =$

TOTAL POINTS: 100