Math5900 Midterm I Spring, 2006 Kelly MacArthur

Name_____ Date_____

Instructions: Please show all your work, as partial credit will be given where appropriate. If there is no work shown, you may not get any points for an answer, even if it's correct. Please put answer in the designated place.

1. *(10 points)* Write a mathematically convincing argument to explain the formula $1+2+3+...+n=\frac{n(n+1)}{2}$.

2. *(10 points)* Find three irrational numbers between 4 and 5.

Answer 2: _____, _____, _____

3. *(20 points)*Convert these numbers to a different base as indicated.

(a) 467_8 to base 10

467_8 = _____

(b) 10111011_2 to base 10

10111011_2 = _____

(c) 312 to base 4

312 = _____

(d) 555 to base 5

555 = _____

4. *(15 points)*Draw a Venn Diagram for all the number systems (including fractions) and place these numbers in the proper place in the Venn Diagram.
   (a) -3.2
   (b) 7.03
   (c) -1.212112111...
   (d) $\sqrt{3}$
   (e) -5
   (f) $-0.\overline{9}$
   (g) $\frac{14}{2}$
   (h) $14.9\overline{6}$
   (i) 0
   (j) $\frac{4}{9}$

5. *(20 points)*Convert these numbers from one form to another to fill up the table.

Decimal	***Percent***	***Fraction***
	42.00%	
		$\frac{99}{225}$
0.19		
$3.01\overline{5}$		
		$\frac{29}{6}$

6. *(15 points)* If the statement is true, write true in the blank. If it's false, give an example which shows that the statement is not true OR correct the statement (just negating the statement is not allowed!).

(a) The set of irrational numbers is closed under addition. T or F (circle one)

_____

(b) -x is a negative number. T or F (circle one)

_____

(c) The decimal 0.0031 is read "31 thousandths." T or F (circle one)

_____

(d) The set of rational numbers is the union of the set of fractions with the set of integers. T or F (circle one)

_____

(f) Addition is commutative. T or F (circle one)

_____

(g) The square root of any positive rational number is irrational. T or F (circle one)

_____

(h) The additive identity is 1. T or F (circle one)

_____

Choose 5 of the following 7 questions to do. Indicate clearly (by circling "Yes")which problems you want graded. I will only grade 5 problems!!
Each question is worth 10 points.

A. (Grade: Yes or No) A 40-row auditorium seats 18 people in the first row, 19 in the second row, 20 in the third row and so on. Use short-cuts to find the total number of seats in the auditorium.

Answer A: _____

B. (Grade: Yes or No) The difference between two numbers is 11 and their product is 476. What is the sum of the two numbers?

Answer B: _____

C. (Grade: Yes or No) For the sequence 6, 10, 14, 18, 22, ...
(a) Find a formula to give the nth term in the sequence.
(b) What is the 100^{th} term?

Answer C: (a) _____ (b) _____

D. (Grade: Yes or No) At a benefit concert, 600 tickets were sold and $1500 was raised. If there were $2 and $5 tickets, how many of each were sold?

Answer D: # $2 tickets= _____, # $5 tickets = _____

E. (Grade: Yes or No) There are 26 children in a class, including exactly 12 girls and 20 eight-year-olds. How many eight-year-old girls could there be? (Give *all* possible answers.)

Answer E: _____

F. (Grade: Yes or No) Write a mathematically convincing argument to explain why the sum of any seven consecutive integers is always divisible by 7.

G. (Grade: Yes or No) Joe and Sue are the same age. Joe is younger than Paul. Paul is older than Jane. Is (i) Joe older than Jane, (ii) younger than Jane, or (iii) is it impossible to tell from the given information?

Answer G: _____