Name: _____

School: _____

TI 89/92 Calculator Exam

Write your answer on the answer sheet.

1. Find the sums of the values a, b and c so that the graph of $f(x) = ax^2 + bx + c$ passes through the points (-2,6), (3,7/2), (14,29).

2. Give the prime factors of the number 20,931,601,446.

3. Give the prime factors that are common to 21456326 and 3241157.

4. How many seconds will pass between noon today and noon on February 16, 2097?

5. Give the number of solutions to the equation $x + \cos(30x) = 1$ for $1 < x < 2$.

6. Minh's social security number is $4528311(x+1)x$, where $x + 1$ and x are the unknown final 2 digits. Give the smallest value for x if 37 times the sum of the 9 digits plus 8 times the product of the 9 digits is greater than 45,742.

7. Give the 3rd decimal place in the number

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \cdots + \frac{1}{999} - \frac{1}{1000}$$

8. The number $\sqrt{2}$ can be approximated by setting $x_0 = 1$ and then creating x_1, x_2, ... from the formula $x_n = \frac{1}{2}x_{n-1} + \frac{1}{x_{n-1}}$. Give the 6th decimal place of x_4.

9. Give the smallest positive integer n so that $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \cdots + \frac{1}{n} > \frac{11}{2}$.

10. Give all of the prime numbers p that satisfy $11,201 < p < 11,289$, or state that there are not any prime numbers in this range.

11. Let $f(x) = 2x + \sin(x)$ with the variable x given in radians. Give $f^{-1}(10)$ rounded to 4 decimal places.

12. A woman has $5 in her hand and starts talking to people. Every time she talks to someone they magically change one of her $1 bills into five $1 bills. Assuming she talks to one person after another, without stopping, give the different amounts of money that she will have strictly between 2,134,562 and 2,134,585.

13. Let $f(x) = \cos(1/x)$ and $g(x) = f\left(f\left(f\left(f(x)\right)\right)\right)$. Give a 7 decimal approximation for the sum of the solutions to $10g(x) + 9 = 0$ for $0.076 \leq x \leq 0.082$.

14. Fifteen circles have diameters that are consecutive integers. Give the radius of the largest circle if the sum of the ratios of the circumferences to the areas is as close to 1/100 as possible.

15. Factor the polynomial

$$x^9 - 17x^8 + 60x^7 + 132x^6 - 186x^5 - 294x^4 + 188x^3 + 260x^2 - 63x - 81$$

16. There are 251 students in an auditorium. 43 or these students have seven $1 bills in their pockets, 81 of these students all have the same number of $1 bills in their pockets with the number being larger than 20, 22 of these students all have the same number of $1 bills in their pockets with the number being less than 5. The rest of these students all have $6 in their pockets. All of the students are asked to bring their $1 bills to the front of the room, and the amount of money collected is $2887. Determine whether the students turned in all of their $1 bills, and if they did not turn all of them in find the smallest possible total number of $1 bills that are still in their pockets.

17. Give the number of integers x so that $1 < x < 13{,}567{,}4561$ and x has neither 19 nor 31 as a divisor.

18. Give the number of ways that it is possible to use all of the numbers 54, 74, 112, 131, 172, 191, 213, 261, 436 exactly once in an expression involving only addition and subtraction so that the resulting value is 406.

19. How many different ways is it possible to create the amount $37.25 using dimes, nickels and quarters?

20. According to the Bureau of Engraving and Printing, a dollar bill is approximately 0.11 mm thick. The distance to the moon is approximately 384402 km. The national debt of the United States is currently approximately 9.250 trillion dollars, and it grows at the rate of roughly 0.016% per day. Based upon these numbers, what is the smallest number of full days that will pass before the number of dollar bills associated with the debt can be put in 3 equal stacks that each reach from the earth to the moon?