"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

________________________________
Signature of student

Academic Integrity Task Force, 2004

My signature in this blank allows my instructor to pass back my graded exam in class or allows me to pick up my graded exam in class on the day the exams are returned. If I do not sign the blank or if I am absent from class on the day the exams are returned, I know I must show my Texas A&M student ID during my instructor’s office hours to pick up my exam.

Signature of student ________________________________

Write all solutions in the space provided as full credit will not be given without complete, correct accompanying work, even if the final answer is correct. Use techniques taught in class to solve; do not use brute force (do not use “list by exhaustion” unless that is the only way to solve the problem). Fully simplify all your answers, and give exact answers unless otherwise stated. Make sure that you indicate your answer clearly by circling your response.

““There are only 10 types of people in the world — those who understand binary, and those who don't.””
(10 pts: 1 pt for each TF) On problems 1 through 10, circle either “True” or “False.”

1. True or False: The sum of the first 6 terms of the Fibonacci is 19.
2. True or False: Place value assigns a value to a number depending upon what is on each side of it.
3. True or False: $A \in A$ for all sets $A$.
4. True or False: There are 5 distinct one-to-one correspondences between $\{m, n, p\}$ and $\{p, a, r\}$.
5. True or False: $\emptyset$ is a proper subset of every nonempty set.
6. True or False: $3 + 5 < 2$ is a statement.
7. True or False: Finite set $A$ has $2^n(A) - 1$ subsets.
8. True or False: The number 1 is the additive and multiplicative identity.
9. True or False: If $A \subseteq B$ and $B \subseteq A$, then $A = B$.
10. True or False: Computational estimation is the process of producing an answer to a computation without using computational aids.

11. (2 pts) What is the inverse of “I will carry tissue, if some trees have pollen.”

12. (6 pts) Use Gauss’s method to find the sum: $25 + 28 + 31 + \ldots + 85$. 
13. (2 pts) Use the division algorithm to represent \(11 \div 5\).

14. (2 pts) Define \(a^n\) if \(a\) is any number and \(n\) is any natural number.

15. (2 pts) Provide a counterexample to the statement, “A non-positive number is negative.”

16. (6 pts)
   a. Whole numbers are not closed under what operations (that we have studied)?

   b. What whole number property justifies \((4 + 7) + 2 = 2 + (4 + 7)\)? ________________

   c. What justifies \(479 = 4 \cdot 10^2 + 7 \cdot 10^1 + 9 \cdot 10^0\)? ________________

17. (2 pts) Write “All organisms are composed of cells” in if-then form.

18. (2 pts) Use short division to compute \(984 \div 8\).

19. (4 pts) Write the numeral 406 in Mayan.
20. (2 pts) How many squares are in the given figure? _________

21. (4 pts) Complete the following truth table.

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>~q</th>
<th>p∧~q</th>
<th>(p∧~q)→q</th>
</tr>
</thead>
</table>

22. (4 pts) Use partial products to calculate $T_{11}^8 \times 64_{11}$.

23. (2 pts) Write 143 in Babylonian.
24. (3 pts) Use the set model to illustrate $2 + 4$.

25. (5 pts) Give the general form of the geometric sequence whose $2^{nd}$ term is 10 and whose $5^{th}$ term is 80?

26. (3 pts) Find the difference, as well as model with Base-Two Blocks: $1010_{\text{two}} - 101_{\text{two}}$.

27. (4 pts) Shade $(A \cap C) \cup \overline{B}$ in the Venn diagram.
28. (4 pts) Convert $523_{nine}$ to Roman numerals.

29. (4 pts) A student says that 0 is the identity for subtraction, because if $a$ is a whole number, then $a - 0 = a$. How do you respond?

30. (3 pts) Use the expanded addition algorithm to find the sum: $457 + 963$.

31. (2 pts) If $a + b = c$, identify the following.
   
   a. Dividend: __________
   
   b. Quotient: __________
32. (4 pts) Using the “less than” set definition, prove that $1 < 4$.

33. (4 pts) Prove: $n + 1 = n$, if $n \in W$.

34. (6 pts) Let $A = \{2, 4\}$, $B = \{2, 5\}$, $C = \{p, e, \pi\}$, and universal set $U = A \cup B \cup C$.

   a. List all elements in the set $(A \cap B) \cup C$.

   b. List all proper subsets of set $B$.

   c. List all elements in $A \times B$. 
35. (4 pts) Draw the next 2 figures in the sequence:

36. (4 pts) Use repeated subtraction to calculate \( \frac{1332}{432} + \frac{32}{432}. \)

5-point Bonus: Give an Euler diagram showing the relationships among fiction books \( F \), “Harry Potter and the Philosopher’s Stone” \( H \), books \( B \), paperback books \( P \), and Anne Frank’s “The Diary of a Young Girl” \( D \).