Math 2201

Review Chapter One

1. Examine the following number patterns:

$$1^3 = 1 \quad and \; 1 = 1^2$$
$$1^3 + 2^3 = 9 \quad and \quad 9 = 3^2$$
$$1^3 + 2^3 + 3^3 = 36 \quad and \quad 36 = 6^2$$
$$1^3 + 2^3 + 3^3 + 4^3 = 100 \quad and \; 100 = 10^2$$

   A) Describe the pattern you see.
   B) Use your observation to predict the next equation in the pattern.
   C) Make a conjecture about the sum of the first n cubes.

2. Sadie claims that the difference between any two positive integers is always a positive integer. Do you agree or disagree? Use inductive reasoning to justify your answer.

3. Prove, using deductive reasoning, that the product of two odd integers is always odd.

4. Examine this pattern to determine the next equation.

   37 x 3 = 111
   37 x 6 = 222
   37 x 9 = 333
   37 x 12 = 444

   Is your conjecture correct? Explain how you know.

5. Frank tosses a coin five times , each time it comes up tails. He makes the following conjecture: The coin will come up tails on every toss. Is his conjecture reasonable? Explain.

6. Prove, deductively, that the product of two consecutive odd integers is always odd.

7. The following proof seems to show that 10 =9.9999….. Is this proof valid? Explain

   Let a = 9.99999….

10a = 99.99999…	Multiply by 10
10a – a = 90	Subtract a
9a = 90	Simplify
a = 10	Divide by 9

8. Julie was trying to prove that a number trick always results in 5:

N	Choose a number
N+10	Add 10
5N + 10	Multiply the total by 5
5N - 40	Subtract 50
$\frac{5N-40}{N}$	Divide by the number you started with.

Identify the error in Julie's proof, and correct it.

9. Andy , Bonnie, Candice, and Darlene are standing in line to buy ice cream. Determine the order in which they are lined up, using these clues:
   - Candice is between Andy and Bonnie
   - Darlene is next to Andy
   - Bonnie is not first

10. Two mothers and a daughter got off a city bus, reducing the number of passengers by three. Explain how this is possible.

11. Three little pigs built three houses: one of straw , one of sticks, and one of bricks. By reading the six clues, deduce which pig built each house, and the town in which it was located.

    Clues
    - Penny Pig did not build a brick house
    - The straw house was not medium In size
    - Perry Pig's house was made of sticks, and it was neither medium nor small in size
    - Patricia Pig built her house in Marystown
    - The house in Lawn was large
    - One house was in a town called Epworth

12. Prove the following trick always ends in 10. Do one example and then use deductive reasoning.
    - Choose a natural number
    - Double it
    - Add 20
    - Divide by 2
    - Subtract the original number