

Name _____

Books and Notes may be used. No Calculators. Test is on FRONT and BACK.

- 1) Convert the base 10 number 200 to binary.

- 2) Convert the binary number 101011100_2 to base 16 (hexadecimal).

- 3) Which is a **negation** of the following statement?
If a male student has black hair, then he is from Cuba.
 - a) If a female student has black hair, then she is from Cuba.
 - b) If a student is either male or has black hair, then the student is from Cuba.
 - c) If a student is female and has black hair, then she is from Cuba.
 - d) If a student is female or has black hair, then that student is from Cuba.
 - e) If a student is female or does not have black hair, then that student is from Cuba.

- 4) Which is a **contrapositive** of the following statement?
If a black rock makes a brown streak when scratched on ruff porcelain, then the rock is hematite.
 - a) If a rock is not hematite, then it will not make a brown streak when scratched on ruff porcelain.
 - b) If a rock is not hematite, then it will not make a brown streak when not scratched on smooth porcelain.
 - c) If a black rock makes a brown streak when scratched on ruff porcelain, then the rock is not hematite.
 - d) If a black rock does not make a brown streak when scratched on ruff porcelain, then the rock is hematite.
 - e) If a black rock does not make a brown streak when scratched on ruff porcelain, then the rock is not hematite.

5 (12 points)

Use induction to prove that if $\text{GCD}(a, b) = 1$ then $\text{GCD}(a^n, b^n) = 1$ for $n \geq 1$.

Hint: Use the theorem:

If p is a prime and $p \mid a^n$ for some $n > 1$, then $p \mid a$.