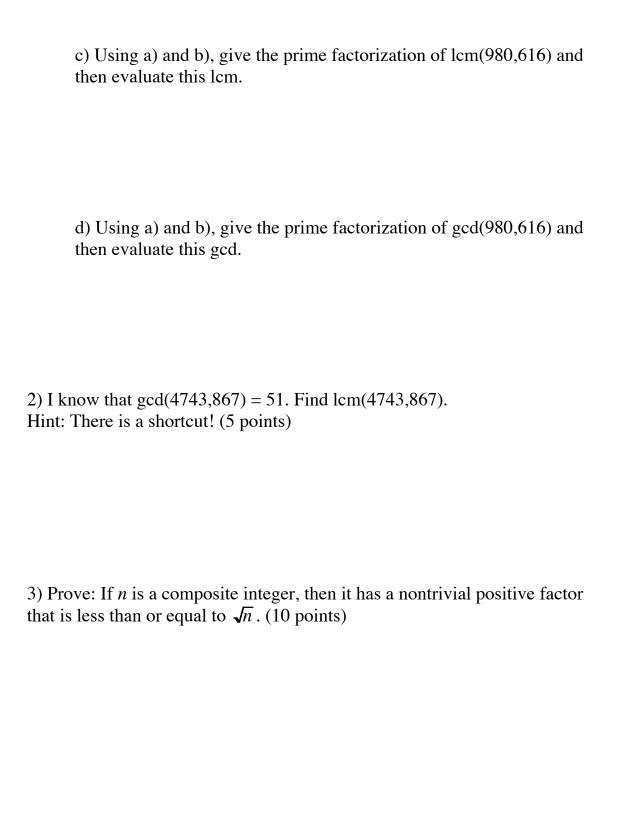
QUIZ 3SECTIONS 2.3-2.5: NUMBER THEORY

Show all work where appropriate! Your proofs will be graded on quality, clarity, completeness, and correctness.

- 1) (24 points total; 6 points each)
 - a) Find the prime factorization of 980.

b) Find the prime factorization of 616.

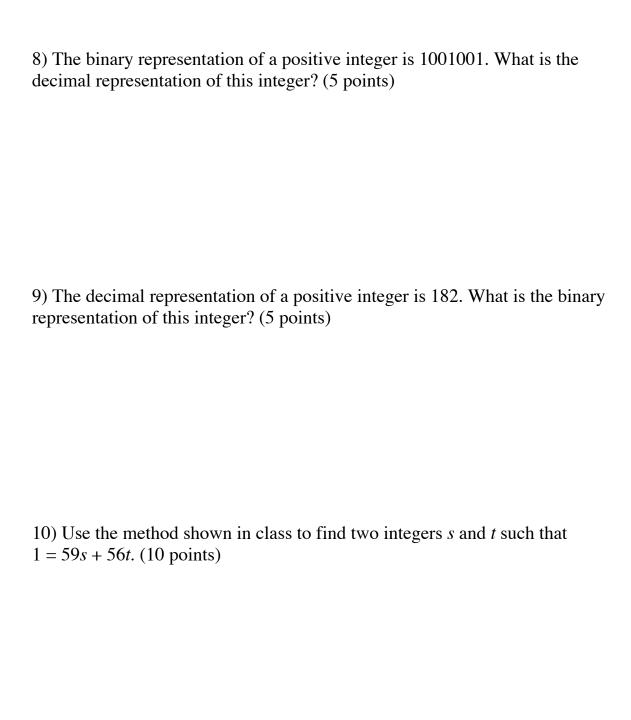


4) Find the highest integer n such that $3^n \mid 100!$; remember that $n! = (1)(2)(3) \cdots (n)$ for positive integers n. (10 points)

5) What is 1000 mod 7? (6 points)

6) Yes or No: Is $3709 \equiv 37 \pmod{51}$? Justify your answer. (5 points)

7) Prove: If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$, then $a + c \equiv b + d \pmod{m}$. Assume that a, b, c, d, and m are integers, with $m \ge 2$. (10 points)



- 11) Use the method shown in class to find three positive integer solutions to the linear congruence $11x + 4 \equiv 13 \pmod{15}$.
 - Hint: 1 = (15)(3) (11)(4).
- A "brute-force" approach will not receive full credit! (10 points)