

Practice Midterm 1, Fall 2002.

1. Give all the solutions (x, y) with $x, y \in \mathbb{Z}$ to the following equations, and determine the solutions with both x and y positive.
 - (a). $15x + 42y = 200$.
 - (b). $15x + 42y = 300$.

2. Let $a, b \in \mathbb{N}^+$. Prove that any common multiple c of a and b is divisible by $[a, b]$. (You may assume any result proved in class.)

3.
 - (a). What is the highest power of 2 which divides $100!$?
 - (b). What is the highest power of 5 which divides $100!$?
 - (c). What is the highest power of 100 which divides $100!$?

4. Decide whether the following statements are true in general and give a reason or counterexample.
 - (a). $(a, b, c) = ([a, b], (a, c))$.
 - (b). $6k + 1$ and $8k + 1$ are relatively prime.