

**ÇANKAYA UNIVERSITY**  
Department of Mathematics and Computer Science

**MATH 365**  
**Elementary Number Theory I**  
First Midterm Practice Exam (A)

November 12, 2007  
16:40 – 18:00

1. True or false?  $7 \mid 203$ ,  $16 \mid -1000$ ,  $-6 \mid 3$ .
2. True or false?  $75 \mid 3000$ ,  $71 \mid 0$ ,  $0 \mid -12$ .
3. Find  $d > 0$  such that  $d \mid 18$ ,  $d \nmid 12$ , and  $36/d \nmid 10$ .
4. Find  $d > 0$  such that  $d \nmid 1000$ ,  $5 \mid d$ ,  $d \mid 60$ , and  $d/2 \mid 75$ .
5. Find  $(51, 34)$  and  $[51, 34]$ .
6. Find  $(16, 81)$  and  $[16, 81]$ .
7. Find  $d > 0$  such that  $18 \mid d$  and  $d \mid 216$ .
8. Find  $d > 0$  such that  $20 \mid d$  and  $d \mid 300$ .
9. What are all divisors of 24?
10. What are all divisors of 30?
11. What are all multiples of 4 between  $-25$  and  $25$ ?
12. What are the multiples of 5 between  $-42$  and  $42$ ?
13. Make a table showing  $b$ ,  $(a, b)$ , and  $(a, b) [a, b]$  for  $a = 8$  and  $b$  running from 1 to 9.
14. Make a table showing  $b$ ,  $(a, b)$ , and  $(a, b) [a, b]$  for  $a = 8$  and  $b$  running from 1 to 9.
15. For what integers of  $a$ , is  $1 \mid a$  true?
16. For what integers of  $a$ , is  $a \mid 0$  true?
17. For what integers of  $a$ , is  $a \mid b$  true for all integers  $b$ ?

True - False. In the next nine problems, tell which statements are true and give counterexamples to those that are false. Assume  $a, b$ , and  $c$  are arbitrary nonzero integers.

19. If  $ab > 0$ , then  $[a, b] \leq ab$ .
20. If  $c \mid a$  and  $c \mid b$ , then  $[a, b] \leq ab/c$ .

**21.** If  $(a, b) = 1$  and  $(a, c) = 1$ , then  $(b, c) = 1$ .

**22.** If  $b \mid c$ , then  $(a, b) \leq (a, c)$ .

**23.** If  $b \mid c$ , then  $[a, b] \leq [a, c]$ .

**24.** If  $a \mid b$  and  $b \mid c$ , then  $a \mid c$ .

**25.**  $(ac, bc) = c(a, b)$ .

**26.**  $(ac, bc) = |c|(a, b)$ .