

NAME:

SID:

Problem 1: Use the Θ -notation to determine the rate of growth of the following functions:

Function	big- Θ estimate
$5n + 3n^4 + 3$	
$n \log^2 n + n^{1.5} + \sqrt{n}$	
$17\sqrt{n} + n3^n \log n + 4^n$	
$\sqrt{n} + 11 \log^5 n$	
$1 + 1/\log n$	

Problem 2: (a) Give the greatest common divisor of 900 and 168. Show your work.

(b) Let $a = 2^9 \cdot 3^2 \cdot 7 \cdot 11^3$ and $b = 2^2 \cdot 3^5 \cdot 7^6$. Give the greatest common divisor of a, b . Justify briefly your answer.

(c) Compute $8^{-1} \pmod{13}$. Show your work.

(d) Solve $4x = 11 \pmod{17}$. Show your work.

Problem 3: Give the multiplication table modulo 7 (only upper-right triangle):

\times	1	2	3	4	5	6
1						
2	-					
3	-	-				
4	-	-	-			
5	-	-	-	-		
6	-	-	-	-	-	

(b) Give the inverses modulo 7 of all numbers 1, 2, ..., 6:

x	1	2	3	4	5	6
x^{-1}						