CIS 3223 Miniquiz 2

Dr Anthony Hughes

Name: Solutions

Temple ID (last 4 digits:

1   (4 pts) Answer the following (circle answer).

(a) $1 + 2 + 4 + \cdots + 2^n = O(2^n)$ (True)   False

(b) $n^2 \log n = o(n^3)$ (True)   False

2   (6 pts) Answer the following.

(a)   Compute $-83 \bmod 19$ $\boxed{12}$

$-95 + 12$

(b)   Compute $15^6 \bmod 13$ $\boxed{12}$

$2^6 \bmod 13$

(c)   Convert the base-3 number 21201_3 into a decimal integer. $\boxed{208}$

$$
\begin{array}{ccccc}
2 & 1 & 2 & 0 & 1 \\
81 & 27 & 9 & 3 & 1 \\
\hline
162 + 27 & & +18 & + & 1
\end{array}
$$

3 (10 pts) Apply the non-recursive **division algorithm** to find the quotient and remainder when x = 110 is divided by y = 7. **Show all steps** (diagram carefully).

110 = (1 1 0 1 1 1 0)$_2$ quotient 15   remainder 6

digit	q	r	r ≥ y
xx	0	0	xx
1	0 0	0 1	F
1	0 0	2 3	F
0	0 0	6 6	F
1	0 0 1	12 13 6	T
1	2 2 3	12 13 6	T
1	6 6 7	12 13 6	T
0	14 14 15	12 12 6	T

(red annotations on left: 1, 3, 6, 13, 27, 55, 110)

If x and y are two n-bit numbers, give a good bound for the number of iterations of the loop in the division algorithm: $O(\log n)$ $\boxed{O(n)}$ $O(n \log n)$ $O(n^2)$